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TRINITY RIVER BRIDGES PROJECT

Environmental Assessment/Draft Environmental Impact Report

Volume 4

Appendices A thru Q

May 5, 2003

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Trinity River Restoration Program
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Volume 4 of 4
Appendices A thru Q

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May 5, 2003

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APPENDIX A

Wagner's Trinity EIS Decision

UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF CALIFORNIA

WESTLANDS WATER DISTRICT, SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, and SAN BENITO COUNTY WATER DISTRICT, Plaintiffs, SACRAMENTO MUNICIPAL UTILITY DISTRICT, Plaintiff-Intervenor, NORTHERN CALIFORNIA POWER ASSOCIATION, Plaintiff-Intervenor v. UNITED STATES DEPARTMENT OF THE INTERIOR, ET AL, Defendants, HOOPA VALLEY TRIBE, Defendant-Intervenor, YUROK TRIBE, Defendant-Intervenor.

))

))))CIV-F-00-7124 OWW DLB MEMORANDUM DECISION AND ORDER RE: CROSS-MOTIONS FOR SUMMARY JUDGMENT (DOCS. 233, 238, 243, 247, 252)

Before the court are cross-motions for summary judgment pursuant to Rule 56 of the Federal Rules of Civil Procedure. Oral argument was heard August 20, 2002.

Plaintiffs Westlands Water District, San Luis & Delta Mendota Water Authority and San Benito County Water District were represented by Daniel O=Hanlon, Esq. Plaintiff Intervenor, Sacramento Municipal Utility District, was represented by Steve Saxton, Esq., and David Lindgren, Esq. Northern California Power Association, Plaintiff Intervenor, was represented by T. Ronald Lapheimer, Esq. Defendant United States

Department of the Interior and all other named Federal defendants, were represented by Charles Shockey, Esq. The Hoopa Valley Tribe, Defendant-Intervenor, was represented by Thomas Schlosser, Esq. The Yurok Tribe was represented by Scott Williams, Esq.

I. FACTUAL AND PROCEDURAL BACKGROUND

This suit involves the United States Department of Interior=s (AInterior@) administration of the Trinity River Division (ATRD@) of the Central Valley Project (ACVP@) and Interior=s implementation of Section 3406(b)(23) of the Central Valley Project Improvement Act (ACVPIA@), to restore and maintain the Trinity River fishery.

II. UNDISPUTED FACTS

The TRD was authorized by an Act of Congress on August 12, 1955. Among the purposes of the TRD Act are that the Secretary provide necessary and beneficial services such as water supply and power and that the Secretary operate the TRD to effectuate the fullest, most beneficial and most economic utilization of the River and adopt appropriate measures to protect fish and wildlife in the Trinity River basin. Trinity River Act of 1955 '2. Construction of the TRD was completed and operations commenced in 1964. The TRD transfers water from the Klamath River Basin, which includes the Trinity River, in Trinity County, California, to the Sacramento River Basin. Its primary function is to store Trinity River

water for regulated diversion to California's Central Valley for agricultural, municipal, and industrial uses. It also produces electrical power. The TRD accounts for twenty-five percent (25%) (500 megawatts (Mw)) of the 2000 Mw of CVP-generated electric power.

The Trinity River Basin is home to protected fish species:

> The native anadromous salmonid species of interest in the mainstem Trinity River and its tributaries include chinook salmon, coho salmon, and steelhead. Of the three species, there are two spawning populations of chinook salmon (spring and fall) and two spawning populations of steelhead (winter and summer). All anadromous species begin their life in fresh water, then migrate to the ocean to mature, and return to spawn in fresh water.

DEIS at 3-151 to 3-152. The spring-run chinook migrates in the spring to summer, spawns in the early fall, rears in winter-spring-summer, and makes its habitat for feeding in shallow, slow-moving waters adjacent to higher water velocities. The fall-run chinook migrates in the fall, spawns in the fall, rears in winter-spring-summer, and makes its habitat in the same areas as the spring-run chinook. The winter steelhead migrates in the fall to winter, spawns between February and April, rears year-round, and makes its habitat in areas of clean cobble where there is refuge from high river flow velocities. The summer steelhead migrates in the spring to summer, spawns between February and April, rears year-round, and makes its habitat in the same area as its related species.

The Hoopa Valley and Yurok Reservations were established in those Tribes= aboriginal lands in the Klamath and Trinity River basins. Since prehistoric times, the fishery resources of the Klamath and Trinity Rivers have been the mainstay of Native American culture and life in the area.

The TRD's construction and operation resulted in the diversion of up to ninety percent (90%) of the average annual discharge into the Trinity River at Lewiston Dam (1,234,000 AF of the 1,396,000 AF inflow), and blocked access to 109 miles of steelhead and salmon spawning and rearing habitat. In response to declining fisheries and degraded habitat conditions, Interior decided in 1981 to increase flows into the Trinity River ranging from 140,000 AF to 340,000 AF annually. In addition, the United States Fish and Wildlife Service (AUSFWS@) was directed to undertake a Flow Evaluation Study to assess fish habitat at various flows, summarize the effectiveness of other instream and watershed restoration activities, and recommend appropriate flows and other measures necessary to better maintain favorable habitat conditions. The study began in October 1984 and was completed by a June 1999 report.

In October 1984, Congress enacted the Trinity River Basin Fish and Wildlife Management Act (A1984 Act@) to restore fish and wildlife populations to pre-TRD levels. The 1984 Act found that the TRD had contributed to a Adrastic reduction in the anadromous fish populations.@

Public Law 98-541, Section 1(1). It directed that the restoration program include:

> (1) The design, construction, operation, and maintenance of facilities to --
> (A) rehabilitate fish habitats in the Trinity River between Lewiston Dam and Weitchpec;
> (B) rehabilitate fish habitats in tributaries of such river below Lewiston Dam and in the south fork of such river; and
> (C) modernize and otherwise increase the effectiveness of the Trinity River Fish Hatchery.
> (2) The establishment of a procedure to monitor (A) the fish and wildlife stock on a continuing basis, and (B) the effectiveness of the rehabilitation work.
> (3) Such other activities as the Secretary determines to be necessary to achieve the long-term goal of the program.

Public Law 98-541, Section 2(a).

In 1991, the Secretary of the Interior increased the minimum flows in the Trinity River to 340,000 AF/year until the Trinity River flow study was completed. The 340,000 AF number was the third-lowest unregulated flow on record.

In 1992, Congress enacted the CVPIA to annually redirect part of the CVP=s water to the environment. CVPIA ' 3406(b)(23) specifically authorizes and directs Interior to restore the Trinity River. It requires that not less than 340,000 AF of water be released into the Trinity River each year for water years 1992-1996 in order to meet federal trust responsibilities to the Hoopa Valley Tribe and to meet the restoration goals of the 1984 Act. CVPIA ' 3406(b)(23). It directs the Secretary of the Interior (ASecretary@), after consultation with the Hoopa Valley Tribe to complete the Trinity River Flow

Evaluation Study (ATRFES@), which had already begun pursuant to the January 14, 1981 Secretarial Decision, no later than September 30, 1996. CVPIA ' 3406(b)(23)(A). The TRFES was to be performed Ain a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery.@ *Id.* Section 3406 then directs the Secretary to forward the TRFES recommendations to several congressional committees no later than December 31, 1996. CVPIA ' 3406(b)(23)(B). If the Secretary and the Hoopa Valley Tribe concurred in the TRFES recommended increases for Trinity River instream fishery flow releases established under CVPIA '3406(b)(23)(B), such restoration flows were to be implemented accordingly. *Id.* If they did not concur, the 340,000 AF minimum flows must remain in effect unless increased by an act of Congress, appropriate judicial decree or agreement between the Secretary and the Hoopa Valley Tribe. *Id.*

In 1996, Congress amended the 1984 Act by the Trinity River Basin Fish and wildlife Management Reauthorization Act of 1995, Pub. L. No. 104-408, 110 Stat. 1338 (1996). The TRFES was not timely completed. Congress directed that Trinity River restoration be measured not only by returning adult anadromous fish spawners, but also by the ability of dependant tribal,

commercial, and sport fisheries to participate fully, through in-river and ocean harvest opportunities, in the benefits of the restoration. Pub. L. No. 104-408. Congress also included language amending the activities to be undertaken by the Secretary. *Id.* The original language directed the Secretary to Amodernize and otherwise increase the effectiveness of the Trinity River fish hatchery. The 1996 Act adds Aso that it can best service its purpose of mitigation of fish habitat loss above Lewiston Dam while not impairing efforts to restore and maintain naturally reproducing anadromous fish stocks within the basin.@ *Id.*

In January 1998, the draft Trinity River Flow Evaluation Report (TRFER) was released. In June 1999, Interior, in consultation with the Hoopa Valley Tribe, published the Trinity River Flow Evaluation Final Report (ATRFEFR@). The TRFEFR recommends permanently increasing the Trinity River fish flows from the statutorily mandated 340,000 AF/year to between 368,900 and 815,200 AF/year, as follows:

Recommended Water Releases Water-Year Class Instream Volume (x 1000 acre-feet) Probability of Occurrence Extremely Wet 815.2 0.12 Wet 701.0 0.28 Normal 646.9 0.20 Dry 452.6 0.28 Critically Dry 368.6 0.12 Weighted Average 594.5

TRFEFR ' 8.1, p. 241.

On October 19, 1999, the United States Bureau of Reclamation (ABureau@) and the USFWS released the draft

ATrinity River Mainstem Fishery Restoration Environmental Impact Statement/Report@ (ADEIS@), which described alternate approaches for restoring and maintaining the Trinity River fishery. Interior published the availability of the draft EIS/EIR and the commencement of a public comment period scheduled to end on December 8, 1999. 64 Fed. Reg. 56364, 1999 WL 827447 (Oct. 19, 1999). The public comment period was extended until January 20, 2000. 64 Fed. Reg. 67584, 1999 WL 1078497 (Dec. 2, 1999); 64 Fed. Reg. 72357, 1999 WL 1247501 (Dec. 27, 1999).

On January 20, 2000, San Luis & Delta-Mendota Water Authority (ASan Luis@) submitted written comments criticizing the DEIS, noting, *inter alia*, that the DEIS failed to analyze the preferred alternative's potential adverse environmental impacts on federally listed endangered or threatened fish species within the Sacramento River system and the Sacramento-San Joaquin Delta (ADelta@), and also failed to analyze how these adverse impacts, if any, could be minimized or avoided. Doc. 35 at && 39-40 & Ex. A.

On March 10, 2000, Westlands Water District (AWestlands@) and San Luis sent a sixty-day notice of intent to sue to Interior, threatening suit if Interior did not undertake a formal ESA consultation on the TRFEFR. On March 29, 2000, Interior forwarded the TRFEFR to Congress, pursuant to CVPIA ' 3406(b)(23) (Athe Secretary shall forward the recommendations of the

Trinity River Flow Evaluation Study . . . to the Committee on Energy and Natural Resources and the Select Committee on Indian Affairs of the Senate and the Committee on Interior and Insular Affairs and the Committee on Merchant Marine and Fisheries of the House of Representatives. If the Secretary and the Hoopa Valley Tribe concur in these recommendations, any increase to the minimum Trinity River instream fishery releases established under this paragraph and the operating criteria and procedures referred to in subparagraph (A) shall be implemented accordingly.@).

On May 8, 2000, Interior responded to San Luis: letter, acknowledging that ESA A' 7 consultation over potential effects to species listed as either threatened or endangered under the ESA . . . must be accomplished as part of the process of making a decision on the Program.@ It reassured that Ano final decision on the Program will be made until both the USFWS and NMFS have issued biological opinions regarding implementation of the Program, and that these opinions will be taken into consideration in making such decisions.@

On October 12, 2000, the National Marine Fishery Service (ANMFS@) formally issued the ABiological Opinion for the Trinity River Mainstem Fishery Restoration EIS and Its Effects on Southern Oregon/Northern California Coast Coho Salmon, Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead@ (ABioOp.@). This BioOp

recognizes that implementation of the report will affect many aspects of the river, including decreased water flows, and discusses reasonable and prudent measures (ARPMs@) to minimize or avoid the preferred alternative's impacts on Afederally listed@ fish.

Also on October 12, 2000, the USFWS issued ARe[-]initiation of Formal Consultation: Biological Opinion of the Effects of Long-term Operation of the Central Valley Project and State Water Project as Modified by Implementing the Preferred Alternative in the Draft Environmental Impact Statement/Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program@ (AUSFWS BioOp@). On November 17, 2000, Interior published notice of the availability of the final EIS/EIR (AFEIS@). 65 Fed. Reg. 69512, 2000 WL 1711646 (Nov. 17, 2000).

On December 14, 2000, Westlands filed suit against defendants, alleging three claims:

(1) Amaladministration@ of the Endangered Species Act (AESA@) by the USFWS;

(2) maladministration of the ESA by NMFS; and,

(3) violation of NEPA by all defendants.

Doc. 1 at 15-24. That same day, Westlands sought an emergency court order to enjoin the defendant, Bruce Babbitt (as Secretary of the Interior), from executing a Record of Decision (AROD@) with the Hoopa Valley Tribe, scheduled to be signed on Tuesday, December 19, 2000. On

December 15, the Hoopa Valley Tribe intervened as a defendant in the case.

The motion for a Temporary Restraining Order ("TRO") was denied in open court on the afternoon of December 15, 2000, and the confirming written order was entered on January 30, 2001. Doc. 85. The application for a TRO was denied because at the time of the December 15 hearing, Secretary Babbitt had not yet signed the ROD. The signing was scheduled for December 19, 2000. Until the ROD was signed, there was no Afinal agency action@ that Westlands could challenge and no authority existed to enjoin the Executive from implementing the statutory function of reaching agreement with the Indian Tribes on the Trinity River Restoration Plan. *Id.* at 4-5.

On December 18, 2000, the Hoopa Valley Tribe concurred in the TRFES recommendations. On December 19, 2000, Secretary Babbitt and the Senior Chairman of the Hoopa Valley Tribal Council signed the ROD. The ROD directs Interior's agencies Ato implement the Preferred Alternative as described in the FEIS/EIR and as provided below,@ and Ato implement the reasonable and prudent measures described in the NMFS and [USFWS] Biological Opinions.@

The ROD=s stated purpose is: restoration and perpetual maintenance of Trinity River=s fishery resources by rehabilitating the river and restoring attributes of a healthy, functioning alluvial river system. AR 17694-95. The essential components to do so are:

1. **Permanently increase variable annual flows for the Trinity River;**
2. **Rehabilitate physical channels, remove riparian berms and establish side channel habitat;**
3. **Sediment management to increase spawning gravels and reduce fine sediments;**
4. **Restore the watershed damage by land use practices;**
5. **Improve infrastructure, including bridges and other structures affected by peak flows.**

On January 5, 2001, Westlands and two new plaintiffs, the San Luis and Delta-Mendota Water Authority, and the San Benito County Water District (collectively Awater districts@), filed a first amended complaint against the federal defendants, alleging four causes of action:

(1) maladministration of the ESA by the USFWS, claiming that by Aissuing a non-jeopardy biological opinion that requires a major change in CVP operations [*i.e.*, preventing any upstream movement of 0.5 km or more of the X2 water quality standard], the USFWS has exceeded its authority under the Endangered Species Act;@

(2) maladministration of the ESA by NMFS, claiming that NMFS acted arbitrarily and capriciously and in excess of its authority under the ESA by issuing a biological opinion that internally conflicts, because it states on one hand that ANMFS does not

anticipate that implementation of the proposed flow schedules will incidentally take any SONCC coho salmon,@ and on the other hand, prescribes RPMs to deal with incidental take;

(1) (3) violation of NEPA by all defendants, claiming that: (a) the draft and final EIS/EIRs do not analyze the impacts of implementing the requirements of the USFWS and NMFS biological opinions; (b) the final EIS/EIR does not adequately describe what CVP operational changes will occur to protect or mitigate the adverse effect upon listed fish, upon which the draft EIS/EIR acknowledges implementation of the preferred alternative may have a significant adverse impact, and simply defers mitigation consideration until later; (c) because the biological opinions modified the proposed action by creating new environmental impacts (or new circumstances and information), the defendants failed to supplement the EIS/EIRs to analyze these impacts and publish the analysis for public comment; (d) the draft and final EIS/EIR do not fairly evaluate alternatives, and are in essence a Apost hoc rationalization to justify a course of action decided upon before NEPA review even began;@ (e) the EIS/EIRs utilize improper definitions of proper purpose by using the Ahealthy river@ standard rather than an objective standard; and, (f) the final EIS/EIR, or a supplement thereto, does not analyze

the impact of implementation of the preferred alternative on California's current energy crisis; and,

(4) violation of the Administrative Procedure Act (AAPA@), claiming that the TRFEFR's recommendations adopted by the ROD are not based on the best available scientific data in violation of CVPIA ' 3406(b)(23)(A), and its conclusions are arbitrary and capricious.

Doc. 35. The Yurok Tribe intervened as a defendant on January 19, 2001. On February 8, 2001, the Northern California Power Agency (ANCPA@) and the Sacramento Municipal Utility District (ASMUD@) intervened as plaintiffs over the opposition of the Hoopa Valley and Yurok Tribes.

The water districts filed a motion for preliminary injunction on January 5, 2001 and NCPA and SMUD moved for a preliminary injunction on February 6, 2001. A preliminary injunction issued on March 22, 2001 limiting the amount of water releases under the ROD to a total of 368,600 AF. All other aspects of the ROD=s Trinity River restoration plan were not enjoined. The decision, made without a complete administrative record, found plaintiffs were likely to succeed on the merits of their claim because the two BioOps imposed significant environmental impacts that were not analyzed in a supplemental EIS/EIR (ASEIS@) and the California energy

crisis was a changed circumstance that should have been evaluated, but was not.

On September 7, 2001, the United States, the water districts, NCPA, and SMUD, but not the Tribes, entered into and filed a stipulation to stay the proceedings in this case until Interior issued a revised ROD following completion of an SEIS. The federal defendants and plaintiffs agreed that the preliminary injunction would remain in place unless otherwise ordered by the court. The defendant-intervenor Tribes did not oppose the stay order, but did not join the stipulation because of paragraphs eight and nine which they believed demanded actions not required by law. However, they found the proposed order Aunobjectionable.@ On October 8, 2001, the court signed the stay order.

On March 14, 2002, the Tribes moved to modify the preliminary injunction for water year 2002 alleging changed circumstances. On April 19, 2002, the preliminary injunction was modified to authorize the release of 468,600 AF of water into the Trinity River for the purposes of fishery protection and restoration for water year 2002. All other aspects of the Trinity River restoration plan were not subject to the injunction. The order modifying the preliminary injunction also vacated the stay and set a schedule for disposition of the case on the merits. To the court=s knowledge, work on the SEIS ceased.

On June 11, 2002 the water districts, NCPA, SMUD, the federal defendants, and the Hoopa Valley Tribe filed cross-motions for summary judgment. The Yurok Tribe did not file a cross-motion for summary judgment but opposed the water districts=, NCPA=s, and SMUD=s motions.

III. LEGAL STANDARD

Summary judgment is warranted only Aif the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact.@ Fed. R. Civ. P. 56(c); *California v. Campbell*, 138 F.3d 772, 780 (9th Cir. 1998). The evidence must be viewed in light most favorable to the nonmoving party. *Indiana Lumbermens Mut. Ins. Co. v. West Oregon Wood Products, Inc.*, 268 F.3d 639, 644 (9th Cir. 2001), *amended by* 2001 WL 1490998 (9th Cir. 2001).

The moving party bears the initial burden of demonstrating the absence of a genuine issue of fact. *Devereaux v. Abbey*, 263 F.3d 1070, 1076 (9th Cir. 2001). If the moving party fails to meet this burden, Athe nonmoving party has no obligation to produce anything, even if the nonmoving party would have the ultimate burden of persuasion at trial.@ ***Nissan Fire & Marine Ins. Co., Ltd. v. Fritz Cos., Inc.*, 210 F.3d 1099, 1102-03 (9th Cir. 2000).** However, if the nonmoving party has the burden of proof at trial, the moving party must only show "that there is an absence of evidence to support the

nonmoving party's case." *Celotex Corp. v. Catrett*, 477 U.S. 317, 325 (1986).

Once the moving party has met its burden of proof, the non-moving party must produce evidence on which a reasonable trier of fact could find in its favor viewing the record as a whole in light of the evidentiary burden the law places on that party. *Triton Energy Corp. v. Square D Co.*, 68 F.3d 1216, 1221 (9th Cir. 1995). The nonmoving party cannot simply rest on its allegations without any significant probative evidence tending to support the complaint. *Devereaux*, 263 F.3d at 1076.

> [T]he plain language of Rule 56(c) mandates the entry of summary judgment, after adequate time for discovery and upon motion, against a party who fails to make a showing sufficient to establish the existence of an element essential to the party's case, and on which that party will bear the burden of proof at trial. In such a situation, there can be no genuine issue as to any material fact, since a complete failure of proof concerning an essential element of the nonmoving party's case necessarily renders all other facts immaterial.

Celotex Corp., 477 U.S. at 322-23.

IV. DISCUSSION

Plaintiffs and plaintiff-intervenors move for summary judgment on five NEPA issues: 1) the Preferred Alternative=s impact on the ESA-listed species in the Sacramento River and Delta were not adequately assessed; 2) the impacts of mitigation measures mandated by the BioOps were not properly assessed; 3) the impact of the Preferred Alternative on power system reliability was not adequately assessed; 4) Interior improperly applied an

unreasonably narrow definition of EIS purpose and artificially restricted the range of alternatives considered under NEPA; and 5) Interior=s environmental assessment was too late. They also move for summary judgment on two ESA issues: 1) the USFWS BioOp unlawfully mandates major changes to CVP operations; 2) the NMFS BioOp arbitrarily mandates implementation of the ROD flows in the absence of the lethal take of Trinity River fish. Finally, plaintiffs move for summary judgment arguing the Secretary=s actions in authorizing the ROD flows were arbitrary and capricious in that there was no adequate basis in experience or science for determining that the adopted permanent flows are necessary or beneficial.

The Hoopa Valley Tribe opposes Plaintiffs= summary judgment motions arguing: 1) further NEPA review is irreconcilable with the CVPIA; and 2) the ROD is neither arbitrary, capricious, nor contrary to law. The Tribe also argues that the CVPIA and equity principles limit the available remedies.

The federal defendants move for summary judgment arguing they have complied: 1) with NEPA; and, 2) with the ESA. The Yurok Tribe argues that the federal government=s trust responsibility requires restoration be given Aparamount consideration.@

A. APPLICABILITY OF FURTHER NEPA REVIEW UNDER CVPIA '3406(b)(23)

The Hoopa Tribe contends that the Secretary has no discretion to delay implementing the flow study recommendations because the Tribe formally concurred in those recommendations in December 2000 and under CVPIA ' 3406(b)(23) the Secretary no longer has discretion after such a concurrence.

NEPA requires federal agencies, to the fullest extent possible, to Ainclude in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment,@ an environmental impact statement that includes the impacts of and alternatives to the proposed action. 42 U.S.C. ' 4332(2)(C). NEPA is given the broadest possible interpretation. *Westlands Water Dist. v. Natural Resources Defense Council*, 43 F.3d 457, 460 (9th Cir. 1994). The phrase Ato the fullest extent possible@ is not Aaccidental nor hyperbolic.@ *Flint Ridge Dev. Co. v. Scenic Rivers Ass=n of Oklahoma*, 426 U.S. 776, 787 (1976). Instead it directs that environmental factors be considered and Anot be shunted aside in the bureaucratic shuffle.@ *Id.*

There are however, exceptions to this rule. Where there is a clear and unavoidable conflict in statutory authority, NEPA gives way. *Id.* at 788. The test is Awhether, assuming an environmental impact statement would otherwise be required in this case, requiring the Secretary to prepare such a statement would create an irreconcilable and fundamental conflict with the

Secretary=s duties.@ *Id.*; *Westlands*, 43 F.3d at 460 (AOnly if there is an >irreconcilable= conflict between the statute and NEPA will the requirements of NEPA not apply.@).

The Hoopa Valley Tribe contends that there are two ways in which NEPA is irreconcilable with CVPIA ' 3406(b)(23): 1) the statutorily mandated time period is too short to allow compliance; and 2) the Secretary lacks discretion.

1. Statutorily Mandated Time Frame

There is an irreconcilable conflict when a statute mandates a fixed time period for implementation and this time period is too short to allow the agency to comply with NEPA. *Flint Ridge*, 426 U.S. at 791; *Westlands*, 43 F.3d at 460. In *Flint Ridge*, the Supreme Court found that a 30-day window within which the Secretary of Housing and Urban Development had to act, was too short to allow compliance with NEPA and this caused irreconcilable conflict. In *Westlands*, the Ninth Circuit held CVPIA '' 3406(b)(2) and (d)(1) were irreconcilable with NEPA because upon enactment, the statute directed the Secretary to take immediate action. *Westlands*, 43 F.3d at 460.

> Section 3406(b)(23) of the CVPIA provides:
> (A) by September 30, 1996, the Secretary, after consultation with the Hoopa Valley Tribe, shall complete the Trinity River Flow Evaluation Study currently being conducted by the United States Fish and Wildlife Service under the mandate of the Secretarial Decision of January 14, 1981 . . . ; and

> (B) not later than December 31, 1996, the Secretary shall forward the recommendations of the Trinity River Flow Evaluation Study, referred to in subparagraph (A) of this paragraph, to [Congress]. If the Secretary and the Hoopa Valley Tribe concur in these recommendations, any increase to the minimum Trinity River instream fishery releases established under this paragraph and the operating criteria and procedures referred to in subparagraph (A) shall be implemented accordingly. If the Hoopa Valley Tribe and the Secretary do not concur, the minimum Trinity River instream fishery releases established under this paragraph shall remain in effect unless increased by an Act of Congress, appropriate judicial decree, or agreement between the Secretary and the Hoopa Valley Tribe.

Pub. L. No. 102-575, ' 3406(b)(23), 106 Stat. 4600, at 4720-21. The Hoopa Tribe concedes that the four years between the 1992 enactment of the CVPIA and the 3406(b)(23)(A) September 30, 1996 deadline provide sufficient time for the Secretary to comply with NEPA. The Tribe argues that implementation of restoration action cannot be further postponed for additional NEPA review because: 1) the deadlines in Section 3406(b)(23) have already passed; and 2) Congress directed that review should end once the Tribe concurred in the recommendation.

In *Flint Ridge*, the Supreme Court held the phrase Ato the fullest extent possible@ in 42 U.S.C. ' 4332 was not to be used to shunt aside consideration of environmental factors Ain the bureaucratic shuffle.@ *Flint Ridge*, 426 U.S. at 787. AThe purpose of the new language is to make it clear that each agency of the Federal Government Shall comply with the directives set out in (' 102(2)) Unless

[sic] the existing law applicable to such agency's operations expressly prohibs [sic] or makes full compliance with one of the directives impossible . . . . [T]he language in section 102 is intended to assure that all agencies of the Federal Government shall comply with the directive set out in said section 'to the fullest extent possible' under their statutory authorizations and that no agency shall utilize an excessively narrow construction of its existing statutory authorizations to avoid compliance." *Id.* at 787-88 (quoting 115 Cong.Rec. 39703 (1969) (House conferees)).

Section 3406(b)(23), enacted in 1992, gave the Secretary four years to complete and present to Congress a flow and restoration study of the Trinity River originally called for by 1984 legislation, which had been in progress for eleven years (since 1981 when the original restoration studies commenced). By the 1996 statutory deadline, the Secretary had taken 15 years to prepare for and complete the NEPA process. As the federal defendants admitted at oral argument, CVPIA ' 3406(b)(23) does not Airreconcilably and fundamentally conflict@ with NEPA nor is there a clear or unavoidable conflict. *See Jones v. Gordon*, 792 F.2d 821, 826 (9th Cir. 1986) (A*Flint Ridge* applies only when a conflict is >clear and unavoidable= and >irreconcilable and fundamental.=@). Compliance with both statutes was entirely possible. The delay or inactions of the federal defendants cannot create a statutory conflict. *See*

Forelaws on Board v. Johnson, 743 F.2d 677, 683-85 (9th Cir. 1984) (holding that agency=s failure to initiate EIS within 9-month statutory deadline for action did not excuse NEPA compliance under *Flint Ridge*).

If the requirements of NEPA are to have meaning, federal agencies cannot be excused from compliance simply because they move at glacial speed. To apply the *Flint Ridge* exception to this case, where the federal agency had four years to comply with NEPA and there was well-known statutory concern for compliance with environmental laws, would negate NEPA review whenever there is a statutory time deadline for action. Federal agencies could avoid NEPA compliance simply by waiting long enough. This defeats the congressional public scrutiny and participation purposes embodied in NEPA. The *Flint Ridge* exception does not apply.

The Hoopa Tribe argues that once it concurred in the recommendations, immediate implementation was mandatory, and under *Westlands* there was no more time to comply with the NEPA requirements. Section 3406(b)(23) is not directly analogous to Sections 3406(b)(2) and (d)(1). Sections (b)(2) and (d)(1) require the Secretary to take action to operate the CVP as directed immediately upon enactment. Section (b)(23) gave the Secretary four years to act. The Tribe argues that the correct performance time period is not the time between enactment and the deadline, but between the Tribe=s concurrence, signing of the ROD and implementation of the flow and restoration

recommendations. This argument ignores that the Secretary had ample time to complete the NEPA analysis within the statutorily allotted time. If it was possible for the Secretary to perform a NEPA analysis, NEPA and *Flint Ridge* require it be done. That the deadline passed does not abrogate this duty. *See Forelaws*, 743 F.2d at 683-86 (holding EIS required despite the fact that the statutory deadline for action had passed). *Flint Ridge* does not apply to this case. Section (b)(23) requires both the Hoopa Valley Tribe=s and the Secretary=s concurrence. If the Secretary did not lawfully concur, the prerequisites for increasing flows under (b)(23) were not met, whether or not the Hoopa Valley Tribe concurred. Even if (b)(23) did preclude further NEPA analysis after concurrence, joint concurrence was required.

2. Secretarial Discretion

The Tribe maintains the Secretary has no discretion not to implement the flow recommendations after the Tribe concurred. Where a federal agency lacks the ability to meaningfully influence a particular action, the procedural requirements of NEPA do not apply. *Sierra Club v. Babbitt*, 65 F.3d 1502, 1512-13 (9th Cir. 1995). A[NEPA=s] procedural requirements are triggered by a discretionary federal action.@ *Id.* at 1512.

Section 3406(b)(23) has several requirements: 1) the TRFES had to be completed by September 30, 1996; 2) not later than December 31, 1996 the Secretary had to

forward the TRFES recommendations to several congressional committees; 3) if the Secretary and the Hoopa Valley Tribe concurred in the recommendations they were to be implemented accordingly. The automatic, non-discretionary language was only operative after both the Hoopa Valley Tribe and the Secretary concurred. The Secretary had full discretion under Section 3406(b)(23), before any concurrence, to scope, analyze, and decide what flow recommendations to make to Congress. During the four year statutorily authorized period for study and formulation of such recommendations there was ample time to conduct a NEPA review. The TRFER was not completed until June 1999. The EIS process commenced in 1986. The DEIS was released October 19, 1999; public comment was extended through January 20, 2000. The TRFER was forwarded to Congress March 10, 2000; Biological Opinions were issued October 12, 2000, and the FEIS/R was completed and published November 17, 2000. The tribe signed the ROD December 19, 2000. The lack of discretion exception to NEPA compliance does not apply. The Secretary was required to comply with NEPA before making flow recommendations, a major federal action which had the potential to adversely effect the environment.

There was adequate time to complete NEPA review before the ROD was signed. The TRFER could not be implemented before that time. The Hoopa Valley Tribe=s motion for summary judgment, on the issue that compliance

with NEPA is not required because '3406(b)(2) is irreconcilably inconsistent with NEPA, is DENIED.

B. NEPA CLAIMS

NEPA is the Athe basic national charter for protection of the environment.@ *Churchill County v. Norton*, 276 F.3d 1060, 1072 (9th Cir. 2001), *amended by* 282 F.3d 1055 (9th Cir. 2002) (quoting *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1215 (9th Cir. 1998)). It is designed to ensure that federal agencies will have available, and carefully consider, detailed information concerning significant public impacts. *Id.* It Aguarantees that the relevant information will be made available to the larger public audience.@ *Id.* (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)). ANEPA also >emphasizes the importance of coherent and comprehensive up-front environmental analysis to ensure informed decision making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct.'" *Id.* at 1072-73 (quoting *Blue Mountains*, 161 F.3d at 1216)(internal citation omitted).

NEPA requires federal agencies to prepare an EIS for Aevery recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.@ 42 U.S.C. ' 4332(2)(C). Because NEPA does not contain a

judicial review provision, an agency=s compliance with NEPA is reviewed under the Administrative Procedure Act (AAPA@), 5 U.S.C. ' 706(2)(A). *Ka Makani `O Kohala Ohana Inc. v. Water Supply*, 295 F.3d 955, 959 (9th Cir. 2002). A decision not to prepare an EIS is reviewed under the arbitrary-and-capricious standard, unless the agency does not perform an environmental assessment. *Id.; Churchill County*, 276 F.3d at 1071. If there is no environmental assessment, the reasonableness standard is used. *Ka Makani*, 2002 WL 1401978A at *2.

The adequacy of an EIS is reviewed under the Arule of reason@ standard. *Churchill County*, 276 F.3d at 1071. AUnder this standard, we ask >whether an EIS contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.@ *Id.* (quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974)). To determine whether an EIS was reasonably thorough courts must make Aa pragmatic judgment whether the EIS=s form, content and preparation foster both informed decision-making and informed public participation.@ *Id.* (quoting *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982)).

When deciding NEPA claims, a court may not impose its own notion of which procedures are best. *Id.* at 1072. Instead, a court=s role is to take Aa hard look.@ *Id.* A[NEPA] is not meant to >mandate particular results= but to provide a process to ensure that federal agencies take a >hard look= at the environmental consequences of

proposed acts. When an agency makes a decision subject to the NEPA's procedural requirements, >the only role for a court is to insure that the agency has considered the environmental consequences; it cannot interject itself within the area of discretion of the executive....=@ *Tillamook County v. U.S. Army Corps of Engineers*, 288 F.3d 1140, 1143-44 (9th Cir. 2002) (quoting *Strycker's Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223, 227 (1980)). Courts must strictly interpret the procedural requirements of NEPA A>to the fullest extent possible= consistent with the policies embodied in NEPA.@ *Churchill*, 276 F.3d at 1072.

Plaintiffs move for summary judgment on six NEPA issues: 1) the Preferred Alternative=s impact on the ESA-listed species in the Sacramento River and Delta was not adequately assessed; 2) the impacts of mitigation measures mandated by the BioOps were not properly assessed; 3) the impacts of the Preferred Alternative on power system reliability were not adequately assessed; 4) Interior improperly applied a wrongfully narrowed EIS purpose to artificially restrict the range of alternatives considered under NEPA; 5) Interior failed to consider and adopt an integrated management alternative; and, 6) the EIS was performed too late.

1. <u>Assessment of Sacramento River and Delta ESA-Listed Species</u>

The claim the DEIS does not analyze the effects of the Preferred Alternative on endangered fish species in the Sacramento River and Delta, and that the issuance of the BioOps did not cure the violation, centers on the contention the public did not have an opportunity to review and comment on the BioOps' analyses. The Preferred Alternative recognizes two overriding objectives: increasing anadromous natural fish production and allowing continued water exports and flood control. EIS 2-3. One screening opportunity adopted as part of the Preferred Alternative is to balance environmental and social beneficial and adverse impacts across the Trinity River Basin, Lower Klamath River Basin, Coastal Area, and Central Valley Basin. *Id.* Plaintiffs advance three contentions: 1) the DEIS did not discuss the Preferred Alternative's direct effects and significance on the Sacramento River and Delta ESA-listed species; 2) when notified of the deficiency, Interior failed to recirculate or adequately supplement the DEIS; and, 3) the addition of language from the BioOps to the FEIS did not cure the DEIS' deficiencies. The federal defendants and the Hoopa Tribe argue the DEIS contained adequate analysis of the Preferred Alternative's impact on the Sacramento ESA-listed species, that the DEIS did not need to be recirculated, and that the inclusion of additional information in the FEIS was sufficient.

a. DEIS Analysis on Sacramento ESA-Listed Species

Plaintiffs claim, Awhile the DEIS admits that the Preferred Alternative could cause >significant impacts= associated with the >increased frequency of Sacramento basin temperature and carryover storage violations,= the DEIS does not analyze those impacts. 18 AR 10653. Rather, it states that these impacts >would need to be evaluated by the NMFS pursuant to ESA.=@ 18 AR 10653.@ Doc. 244 at 5:3-6 (NCPA P & A=s). Defendants point to numerous sections of the DEIS that analyze these impacts.

There is some merit to each position. The DEIS does analyze the impact of the Preferred Alternative on the ESA-listed species in the Sacramento River and Delta. DEIS at 3-167-169 3-172-173, 3-175-177, 3-179-184, B-60-61, B-65, B-74-75, B-77-78, B-89-90. ACompared to existing conditions, the Preferred Alternative would adversely affect fall, winter, and spring chinook salmon by significantly increasing mortality of early life stages of these species within the upper Sacramento River.@ DEIS, at 3-178. A[D]uring all months from February through June, Delta outflows were greater than 10 percent of the years simulated (Table 3-16). Those reductions in Delta outflow may be significant and may adversely affect habitat for Delta species.@ DEIS, at 3-184. The DEIS does not consider or identify mitigation measures for the admitted significant impacts to those species, except to specify Amitigation for impacts to the

Delta smelt and Sacramento splittail would consist of consulting with the Service on impacts and implementing any >required conservation measures.=@ DEIS, at 3-184. This defers consideration of mitigation efforts to the BioOps. AIn that the potential adverse effects to listed species identified in the DEIS/EIR are the subject of consultation under Section 7 of the Endangered Species Act (ESA), with both the U.S. Fish and Wildlife Service (Service) and National Marine Fisheries Service (NMFS), it was entirely appropriate to defer describing specific minimization actions until the consultations had been completed.@ FEIS, D2-65. Consideration of the impacts, not only on Delta species, but all other secondary impacts which would result, were necessarily deferred to future analysis.

The Council on Environmental Quality (CEQ) regulations, which implement NEPA, require a DEIS be prepared and circulated prior to the issuance of an FEIS. 40 C.F.R. 1502.9(a). The DEIS Amust fulfill and satisfy to the fullest extent possible the requirements established for final statements.@ *Id.* AIf a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion.@ *Id.* The CEQ regulations further direct that a DEIS or FEIS be supplemented if Athere are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.@ 40 C.F.R.

' 1502.9(c)(ii). CEQ regulations provide that A[t]o the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by . . . the Endangered Species Act of 1973, and other environmental review laws and executive orders.@ 40 C.F.R. ' 1502.25(a).

The question here is whether the DEIS=s deferral to future BioOps, rather than identifying impacts and discussing mitigation measures in the DEIS, fails to provide Ameaningful analysis.@ An EIS must contain a discussion of possible mitigation measures. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52 (1989); *Okanogan Highlands Alliance v. Williams*, 236 F.3d 468, 473 (9th Cir. 2000); *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1380 (9th Cir. 1998). AImplicit in NEPA=s demand that an agency prepare a detailed statement on >any adverse environmental effects which cannot be avoided should the proposal be implemented,= is an understanding that the EIS will discuss the extent to which adverse effects can be avoided.@ *Robertson*, 490 U.S. at 351-52 (quoting 42 U.S.C. ' 4332(C)(ii)) (internal citations omitted). AWithout such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.@ *Id.* Failure to discuss possible mitigating measures precludes the

parties from meaningful analysis and Interior did not circulate a revised draft.

b. Timing of the EIS

Plaintiffs= assertion that a final EIS should have been completed before the Trinity River flow study was submitted to countered is answered by Interior=s position that the EIS was programmatic and project specific and centered on the recommendations for restoring Trinity River flows and related measures to rehabilitate the fishery, which in turn had to be reviewed by Congress and then concurred in by the Hoopa Valley Tribe. FEIS pp. 1-3. Title 40 C.F.R. '1508.25(a)(2) authorizes a programmatic EIS for A[cumulative actions, which, when viewed with other proposed actions, have cumulatively significant impacts and therefore should be discussed in the same impact statement.@ Interior correctly maintains that the flow study was one of several related actions appropriately discussed in a single FEIS which incorporated all components of the Trinity River restoration plan and culminated in the ROD, for which the FEIS was prepared. Requiring a separate EIS for each component of a single major federal action could unduly delay and overtax governmental resources. *March v. Oregon Natural Resources Council*, 490 U.S. 360-71 (1989).

However, where, as here, most of the Agency=s discussion and response to disputed issues of impacts is not presented until long after the public comment period

on the DEIS closed and substantial issues were raised which were not subjected to informed public participation, the NEPA process broke down.

c. Inclusion of Mitigation Factors in FEIS

Plaintiffs argue that the inclusion of mitigation factors in the FEIS did not correct the deficiency in the DEIS because the FEIS mitigation factors were taken from the two BioOps which were excluded from public scrutiny and not subjected to public comment. Plaintiffs request the ROD be set aside.

NEPA serves dual purposes: AIt ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision.@ *Robertson*, 490 U.S. at 349 (AIt gives the public the assurance that the agency has indeed considered environmental concerns in its decisionmaking process, and, perhaps more significantly, provides a springboard for public comment.@) (internal quotations and citations omitted); *Northwest Res. Info. Ctr., Inc. v. Nat=l Marine Fisheries Serv.*, 56 F.3d 1060, 1064 (9th Cir. 1995) (AThe purposes of an EIS are to provide decisionmakers with sufficiently detailed information to aid in determining whether to proceed with

the action in light of its environmental consequences and to provide the public with information and an opportunity to participate in the information gathering process.@).

Inclusion of new information in the FEIS (bypassing public input) does not automatically invalidate the FEIS. The CEQ regulations provide a procedure by which new information in an FEIS may be subjected to NEPA review. 40 C.F.R. ' 1502.9(c). That procedure determines whether information is significant enough to warrant additional public comment, as part of the flexibility agencies have in responding to public concerns. *See California v. Block*, 690 F.2d 753, 771 (9th Cir. 1982) (ATo effectuate [the purpose of public comment], agencies must have some flexibility to modify alternatives canvassed in the draft EIS to reflect public input.@).

Section 1502.9(c) provides that an agency shall prepare a supplement to a draft or final EIS if: 1) there are substantial changes in the proposed action that are relevant to the environmental concerns; or 2) there are environmentally relevant, significant, new circumstances or information that bear on the proposed action or its impacts. 40 C.F.R. ' 1502.9(c)(1). A[A]n agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decisionmaking intractable, always awaiting
updated information only to find the new information outdated by the time a decision is made.@ *Marsh v. Oregon*

Natural Res. Council, 490 U.S. 360, 373 (1989). However, A[i]f there remains major Federal action to occur, and the new information is sufficient to show that the remaining action will affect the quality of the human environment in a significant manner or to a significant extent not already considered a supplemental EIS must be prepared.@ *Id.* at 374.

New information is significant where it Aprovides a seriously different picture of the environmental landscape.@ *City of Olmsted Falls, Ohio v. Fed. Aviation Admin.*, 292 F.3d 261, 274 (D.C. Cir. 2002); *see also Davis v. Latschar*, 202 F.3d 359, 369 (D.C. Cir. 2000) (A[O]nly those changes that cause effects which are significantly different from those already studied require supplementary consideration.@) (internal quotations omitted). A[T]he key to whether a Supplemental Environmental Impact Statement is necessary is . . . whether the proposed [work] will have a significant impact on the environment in a manner not previously evaluated and considered.@ *South Trenton Residents Against 29 v. Fed. Highway Admin.*, 176 F.3d 658, 663 (3d Cir. 1999).

An agency decision to forego completing an SEIS will not be set aside unless it is arbitrary and capricious. *Friends of the Clearwater v. Dombeck*, 222 F.3d 552, 556 (9th Cir. 2000). AReview under this standard is to be searching and careful, but remains narrow, and a court is not to substitute its judgment for that of the agency.@

Id. (quoting *Mt. Graham Red Squirrel v. Espy*, 986 F.2d 1568, 1571 (9th Cir. 1993).

Here, as discussed below, Interior decided all the Anew@ information was not significant enough to warrant a supplemental EIS or Arecirculation.@ ANormally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.@ *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *O'Keeffe's, Inc. v. U.S. Consumer Product Safety Comm'n*, 92 F.3d 940, 942 (9th Cir. 1996). A[T]he agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made.@ *Motor Vehicle Mfrs.*, 463 U.S. at 43; *Dioxin/Organochlorine Ctr. v. Clarke*, 57 F.3d 1517, 1525 (9th Cir. 1995).

In this case, Interior discussed in the FEIS whether an SEIS was necessary based on the new information. It concluded without analysis or factual support, that the new information in the FEIS was Amainly for clarification purposes and does not represent significant new information requiring recirculation.@ FEIS D2-71. Evaluating the significance of the new information under

the Aseriously different picture@ standard, Interior concluded that Anone of the new information in the Final EIS rises to that level.@ FEIS D2-72. This legal conclusion is wrong for the DEIS as to Delta-Sacramento River species, BioOp RPMs, range and substance of a reasonably integrated management alternative, and hydropower impacts, and because the DEIS deferred all these issues, the public notice and comment period closed January 20, 2000, and the FEIS issued November 17, 2000, does not take a hard look at any of the issues raised. Interior does not discuss why it believes that the Anew information@ is not significant and none of its responses in the FEIS analyzes the merits of new mitigation measures; instead it offers an argumentative justification for avoiding supplemental considerations by its legal conclusion that all the issues raises are insignificant. Plaintiffs gave notice of concerns about impacts on such species and related issues in the public comment period. 18 AR 10653, 29 AR 17492-93, 19537-38. Because Interior did not critically examine the relevant data or articulate the basis for its decision not to supplement the EIS, which did not identify any specific mitigation measures or probable secondary effects of flow increases on Sacramento River and Delta species, but rather deferred to future BioOps and/or ESA reconsultations, the significance of this failure must be analyzed.

Block v. California analyzes the need for a supplemental DEIS to address information discussed for the first time in an FEIS and holds that although agencies must have some flexibility in modifying alternatives contained in a DEIS, an EIS must provide the public with sufficient information to permit meaningful consideration. *Block*, 690 F.2d at 771-72. AThe EIS process should serve both to alert the public of what the agency intends to do and to give the public enough information to be able to participate intelligently in the EIS process.@ *Id.* at 772.

Here the additional information, added after the DEIS was circulated, addressed mitigation factors. The DEIS does not discuss mitigation factors related to the Sacramento River and Delta ESA-listed species nor the secondary effects of increased flows on other CVP-water users. An EIS must contain a discussion of possible mitigation measures. *Robertson*, 490 U.S. at 351-52; *Okanogan*, 236 F.3d at 473; *Neighbors of Cuddy Mountain*, 137 F.3d at 1380; *see also* 40 C.F.R. ' 1502.14(f) (mitigation measures shall be included in discussion of alternatives); 40 C.F.R. ' 1502.16(h) (mitigation measures required). AImplicit in NEPA=s demand that an agency prepare a detailed statement on >any adverse environmental effects which cannot be avoided should the proposal be implemented,= is an understanding that the EIS will discuss the extent to which adverse effects can be avoided.@ *Robertson*, 490 U.S. at 351-52 (quoting 42

U.S.C. ' 4332(C)(ii)) (internal citations omitted). A[O]mission of a reasonably complete discussion of possible mitigation measures would undermine the >action-forcing= function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.@ *Id.*

Block requires that a supplemental EIS be prepared if the public was not given sufficient information to intelligently participate in the NEPA process. *Block*, 690 F.2d at 771-72. *Robertson* holds that failure to include mitigation measures prevents the public from properly evaluating the proposed action. *Robertson*, 490 U.S. at 351-52. Under the *Block* test, the inclusion of previously undisclosed mitigation measures is significant enough to require an SEIS.

Courts have also determined that an SEIS is required if the changes cause effects which are significantly different from those already studied. *Davis*, 202 F.3d at 369. Here, the DEIS recognized that the impact on Sacramento River and Delta ESA-listed species, salmon, Sacramento splittail, and Delta smelt, was significant, but deferred determination of any mitigation measures for future consideration. The failure to analyze, or even identify, mitigation measures to address changes that will be caused by the new flow regime and their effects, have an undetermined potential to be different from those already studied. *See Robertson*, 490 U.S. at 352 (AAn

adverse effect that can be fully remedied by, for example, an inconsequential public expenditure is certainly not as serious as a similar effect that can only be modestly ameliorated through the commitment of vast public and private resources.@). The omission of discussion of mitigation measures foreclosed any public input on the issues of whether and what CVP operations management alternatives existed and were feasible; and whether alternate water sources existed or if reduced flows could reduce the impact on species and other CVP users.

Two of the factors listed in 40 C.F.R. ' 1508.27, that affect whether action is significant, are the likelihood that the action will be highly controversial, 40 C.F.R. ' 1508.27(b)(4), and the degree to which the action may adversely affect an endangered species, 40 C.F.R. ' 1508.27(b)(9). Interior knew that any decision it made relating to increased permanent Trinity River flow releases and its effects on the Sacramento and Delta ESA-listed species and secondary effects on power generators, municipal, industrial, and agricultural water users, was going to be controversial and significant within the meaning of 40 C.F.R. '1502.9(b)(2), (3), (4), and (7). Prior to the issuance of the BioOps or the FEIS, San Luis submitted comments criticizing the DEIS on these grounds and Westlands sent a 60-day notice of intent to sue unless formal ESA Section 7 consultation was undertaken. Interior also had specific knowledge

that the new information was related to how Sacramento river and south of the Delta endangered species would be affected by increased TR flows.

Defendants= collective response in contending Interior was not arbitrary or capricious, is to ignore the absence of consideration of mitigation measures in the DEIS: their identity, significance, effectiveness, effects, and controversy over their substance and range. Any discussion was included for the first time in the FEIS without public input and used as a post hoc rationalization for the decision not to supplement the EIS on the grounds that species= and other impacts resulting from the Preferred Alternative are not significant. Applicable NEPA regulations require more, see 40 C.F.R. ' 1502.9(c), and as to revised portions of the DEIS, *see* 40 C.F.R. ' 1502.9(a).

Anecdotal evidence indicates Interior chose to assume the risk of apparent NEPA violations after the March 10, 2000, ESA notice. 7 AR 3865, 3894, 10 AR 20174, (Ex. A to Robinson Dec.). Interior as much as admits it could not cure the NEPA violations that had occurred as of that time.

2. Effect of BioOps

Plaintiffs argue that the ROD should be set aside because: 1) Interior failed to assess the environmental impacts of the BioOps= mitigation measures in the FEIS; and, 2) even if Interior did analyze the RPMs, inclusion

in the FEIS requires an SEIS. Plaintiffs argument implicates two of the BioOps: reasonable and prudent measures (ARPMs@):

1) The USFWS: RPM:

> Reclamation shall minimize the effects of reoperating the CVP resulting from the implementation of the Preferred Alternative within the Trinity river basin on listed fish in the Delta. . . . These terms and conditions are non-discretionary. To implement Reasonable and Prudent Measure number one Reclamation must implement the following:
>
> $ If Reclamation in its annual operations planning process detects that implementation of the Preferred Alternative will result in an upstream (eastward) movement of X2 in any month between February 1 through June 30 of 0.5 km, Reclamation shall incorporate within its operating plan measures that can and will be implemented to minimize or eliminate such upstream movements.

AR 17537-38 (footnote added).

2) The NMFS: RPM:

> 7. In dry and critically dry water year types, Reclamation and USFWS shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento rivers . . .
>
> The USFWS and Reclamation must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.
>
> . . . .
>
> 7.a. Be prepared to make use of auxiliary bypass outlets on Trinity Dam as needed . . . .

AR 17493-94. These RPMs were incorporated into the FEIS, pages 2-43-45, and the ROD, AR 17703.

a. <u>Assessment of BioOps in FEIS</u>

Plaintiffs argue that the BioOps RPMs are Aconnected actions@ that had to be considered in an FEIS and are invalid because Interior did not do so. Defendants respond that these mitigation measures were analyzed in the FEIS and that the actions are not connected.

i. Connected Actions

Section 1508.25 of Title 40, C.F.R. defines Aconnected actions@ as those that Aare closely related and therefore should be discussed in the same impact statement.@ 40 C.F.R. ' 1508.25(a). Actions are connected if they:

> (i) Automatically trigger other actions which may require environmental impact statements.
> (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
> (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Id. The federal defendants argue that the BioOps and the EIS are not Aconnected actions,@ but are rather Aa single federal action, approval of the ROD to approve fishery restoration measures.@ Doc. 258 at 20:16-21:1. Section 1502.4(a) provides that A[p]roposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement.@ 40 C.F.R. ' 1502.4(a). Whether the actions are Aconnected actions@ as argued by NCPA, or Aa single action@ as argued by the federal defendants, the result is the same: they should be evaluated in a single EIS. The March 22, 2001 memorandum decision notes:

AThere is no question that the two BioOps are >interdependent parts of a larger action,= . . . depending on implementation of the preferred alternative for their justification, because the only reason for the X2 measure is that the ROD=s implementation of the FEIS=s preferred alternative . . . reduces the water now flowing. . . .@ Doc. 136 at 47 n.49. The Aactions@ which caused the need for the BioOps are the increase of flows in the Trinity River to re-establish and maintain the fishery which results in less water reaching the Sacramento Delta. The ROD and the FEIS adopted and incorporated the BioOps= RPMs as mitigation measures. Whatever nomenclature is applied to the relationship between the BioOps= RPMs, the EIS, and the ROD, the end result is that they are inextricably intertwined as part of the same action to restore Trinity River fishery, which in turn requires they be analyzed in the same EIS. Interior admits it was required to comply with NEPA and the ESA in implementing '3406(b)(23), but argues issuing the ROD, a single federal action, was not a series of connected, independent actions which required two separate FEISs. The distinctions made by the parties are without meaningful difference. Interior rejoins that the FEIS, App. D-2 at pp. 65-66, discusses impact on species and ways to minimize incidental takings. The ROD is the end result of an integrated series of actions, which did not require a separate EIS for each action.

ii. <u>Central Valley Species</u>

The October 12, 2000, Reinitiation of Formal Consultation and Biological Opinion authored by USFWS focused on status of species including Delta smelt (AR 17518) and Sacramento splittail. (AR 17520). Analysis of the implementation of the Preferred Alternative on Delta smelt and Sacramento splittail appears at AR 17532-34 and its cumulative effects at AR 17535-36. The effects analysis focuses on temperature changes, entrainment by pumps during diversions of water, moving fish habitat upstream in times of decreased outflows, effects of toxic substances on spawning habitat, state or local levee maintenance, introduction of exotic species, wave action in water channels, degrading banks or channels, and changes in flow levels. The cumulative effects are considered Anot likely@ to jeopardize continued existence of the smelt or splittail or to result in the destruction or adverse modification of critical habitat. The ITS recognizes Delta smelt and Sacramento splittail may be harmed, harassed, injured, or killed by direct entrainment, but implementation of the Preferred Alternative flow levels on incidental take is expected to remain at the level of the March 6, 1995, Biological Opinion. The USFWS RPMs do not specify what CVP operational measures will be implemented to minimize or eliminate upstream X2 movement greater than .5km in any month between the period from February 1st through June 30th. Reporting about take or suspected take will be continuous.

The NMFS Biological Opinion of October 12, 2000, identifies coho salmon, chinook salmon, and steelhead as Central Valley and Sacramento River endangered or threatened species, and analyzes effects of Preferred Alternative on these species at AR 17472 to 17489. Extended temperature analysis is performed using temperature criteria and reservoir carryover storage. Increased temperature violations are recognized at AR 17482 and use of Trinity Dam auxiliary outlets to improve temperature conditions by bypass operations from July to October are recommended. NFMS concludes that with auxiliary bypasses, Trinity River temperature criteria can be achieved 95% to 96% of the time without altering the timing of exports to the Sacramento River. The analysis opines that changes to X2 location under the proposed action are not likely to adversely affect winter run chinook salmon in the Delta, AR 17484, referring to Table 3-15 of the TRMFR DEIS, the upper Sacramento River, AR 17485, and reaches the same conclusion for Central Valley steelhead. AR 17485-86. The NMFS BioOp summary finds no change to temperature-related mortality of spring-run chinook salmon and steelhead, no effect in the Delta on smelt survival, and no appreciable diminution of critical habitat that affect fish mortality. The NMFS BioOp analyzes cumulative effects on the Central Valley species at AR 17489 and concludes at AR 17490, that the Preferred Alternative is not likely to jeopardize continued existence of any salmon species nor is it

likely to destroy or adversely modify critical habitat. What the NMFS BioOp does not do is to analyze what effect on power generation the bypass alternative will have or whether there will be related CVP reoperations such as reallocation of additional CVP water.

iii. Were the RPMs Analyzed in the EIS?

Plaintiffs argue that the impacts of the mitigation measures specified by the BioOps and incorporated by the FEIS were not analyzed in the EIS nor subjected to public comment. They maintain that it was impossible to do so, because the BioOps were not issued until shortly before the FEIS was released. Defendants rejoin that the mitigation measures were analyzed in the FEIS, albeit without public participation.

A. Auxiliary Bypass RPM

The impact of the mitigation measure to use the auxiliary bypass outlets at Trinity Dam was discussed in the FEIS. The APowerplant Bypass@ thematic response refers to temperature control benefits and costs to CVP power customers of using the auxiliary bypass outlets. FEIS at D2-79-90. Interior discussed the relation of CVP power generation to total California powers generation and demand, but does not break out Northern California effects. *Id.* at D2-91-101. It concluded any CVP power supply was not critical to the total California electrical demand. *Id.* at D2-91-92. It is not disputed that the DEIS and public comment phase did not analyze

power impacts except from a socioeconomic standpoint. 22 AR 13320.

As to temperature control ramifications, Interior relies on the upper Sacramento River Temperature Task Group Ato develop future temperature controls and flows,@ without specific analysis of what means will be utilized to achieve temperature objectives or the resulting impacts. A nondiscretionary condition to Amake use of auxiliary bypass outlets on Trinity Dam, as needed@ is imposed. 27 AR 17492-494. No reference is made to whether additional CVP water will be needed for any auxiliary bypass.

The applicable Arule of reason.@ *Churchill County*, 276 F.3d at 1071, asks Awhether an EIS contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.@ *Id.* (quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974)). There was no public input in the discussion in the FEIS related to the impact of using the auxiliary bypass outlets. The FEIS did not need to specifically name the BioOps as plaintiffs contend, if it discussed the subject matter of the impact of the BioOps RPMs with reasonable thoroughness, however, the FEIS does not perform such an analysis.

B. X2 RPM

As to the X2 RPM, the parties= arguments highlight different understandings of what has to be analyzed. As

defendants argue, the FEIS discussed the impact of X2 movement on Delta ESA-listed species. The Preferred Alternative does not mandate moving the measurement location for X2, nor does it change the X2 standard. It is not possible to know the effect that X2 RPM compliance will have, because defendants did not identify or analyze the impact of any mitigation measures which actually will be used to address X2 effects. Rather, defendants respond, based on USFWS and FMS input, that effects of X2 compliance are insignificant, and if X2 measures are needed, AESA reconsultation will be reinitiated.@ There is no discussion of where additional water will come from, or what quantity will be needed to maintain the X2 standard within or close to 0.5km of its required location. Implementation of the Preferred Alternative admittedly will affect the Sacramento River and Delta ESA-listed species to some degree. The FEIS incorporates future unspecified mitigation measures to lessen these effects. These mitigation measures in turn cause effects; impacts, direct or indirect, and their significance must be analyzed. 40 C.F.R. '' 1502.16(a)-(b).

The RPMs only describe procedures not what specific actions Interior will actually take, or what effects such actions will have. Defendants argue that the X2 RPM Amost emphatically did not require that Reclamation take any and all measures to ensure that the X2 location did not change. Instead, FWS instructed Reclamation as part of

the >operations planning process,= to >incorporate within its operating plan measures= that >minimize or eliminate= upstream movement.=@ Doc. 258 at 16:14-17 (Fed. Def.=s Opp=n). From this, defendants conclude, because (1) there is no qualitative difference between the existing Water Quality Control Plan (AWQCP@) X2 standard and the X2 RPM and, (2) the X2 RPM only requires that Reclamation consult if there is a change greater than 0.5 km, there are no significant impacts to analyze. Whether this failure to assess the impact of the X2 RPM violates NEPA is determined under the Arule of reason@ standard; *Churchill County*, 276 F.3d at 1071, which asks, Awhether an EIS contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.@ *Id.* (quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974)). The thoroughness of an EIS is decided by Aa pragmatic judgment whether the EIS=s form, content and preparation foster both informed decision-making and informed public participation.@ *Id.* (quoting *Block*, 690 F.2d at 761).

Plaintiffs maintain that X2 RPMs result in a de facto change in the current X2 standard under the Water Quality Control Plan (AWQCP@), which itself makes such RPMs significant. Defendants rejoin that X2 RPMs do not change the current X2 standard. Their experts say otherwise. Michael G. Thabault, declares:

> Section 7 of the endangered Species At of 1973 (as amended) (Act) requires the Service to evaluate the effects of the actions of Federal agencies on species listed pursuant to Section 4. As part of this evaluation the Service must

consider the direct, indirect, interrelated, and interdependent effects of the action, as well as including cumulative effects to listed species. This analysis must be considered in the context of the environmental baseline for the species. The environmental baseline is defined at [50 CFR '402.02] as:

> Athe past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process.@

It is essentially the status of the health of the species at a snapshot in time. The current operation of the CVP and SWP have resulted in an environmental baseline condition that exceeds (i.e., is better for the species) the standards established in the WQCP. . . . The Service evaluated the effects of the Preferred Alternative on listed species and how the action may affect Reclamation=s ability to maintain the environmental baseline. The Service concluded that there would be affects to the location of X2 which may effect distribution, spawning, rearing, and foraging abilities of the delta smelt. Also, reduction in flows may, at times, effect the spawning and rearing opportunities for the Sacramento splittail. The Service subsequently developed a Term and Condition and associated Reasonable and Prudent Measure (RPM) that could minimize the effects, and in some instances eliminate the effects of the action, <u>within the confines of Reclamation=s CVP operations</u>. (Emphasis added.)

Doc. 75 at 5:6-28. According to Mr. Thabault, the baseline against which the X2 RPM is measured exceeds the minimum X2 requirement under the WQCP. The X2 RPM provides: AIf Reclamation in its annual operations planning process detects <u>that implementation of the Preferred Alternative will result in an upstream (eastward) movement of X2</u> in any month between February 1 through June 30 <u>of 0.5 km, Reclamation shall incorporate</u>

within its operating plan measures that can and will be implemented to minimize or eliminate such upstream movements.@ AR 17493-94 (emphasis added). Implementation of this RPM is nondiscretionary. *Id.*

Based on its plain wording, the X2 RPM requires Interior to incorporate within its CVP operating plan measures that will minimize or eliminate eastward movement of X2 exceeding 0.5km. This requires more than consultation and goes beyond prescribing the process to be followed; it requires affirmative federal action. Mr. Thabault states that the X2 Aterm and condition does not modify the already stated commitment of the Bureau of Reclamation to avoid and minimize the effects to species protected pursuant to the Act by minimizing the effect of incidental take (water) as measured by X2. The term and condition merely sets the threshold for when those actions developed and committed to by the Bureau of Reclamation should be implemented.@ That is precisely plaintiffs: point; the X2 RPM creates an absolute standard defining when Reclamation must act. Mr. Thabault:s declaration recognizes that the present location of the X2 from which movement is measured under the RPM already exceeds the WQCB standard.

Chester Bowling, Operations Manager of the Central Valley Operations Office for the Bureau, declares that Reclamation determined that although implementation of the Preferred Alternative would not violate the WQCP; simulations show that in some years X2 will move upstream

in excess of 0.5km. Doc. 290 at &8. Other than ESA reconsultation no specific mitigation action is identified.

Plaintiffs argue that this new standard is significant, defendants argue that it is not. Mr. Bowling and plaintiffs' expert, James Snow, agree that there are months in some years in which computer simulations indicate that X2 will move upstream in excess of 0.5km invoking the X2 RPM's requirement for action. Doc. 281 at &10; Doc. 290 at &8. Specifically, the X2 will move eastward more than 0.5km in 20 percent of all Junes, and in four years, X2 will move 0.5km in more than one month. Doc. 281 at &10.

Mr. Snow calculates the cost in water to comply with the RPM in the four years where the X2 RPM standard is exceeded in more than one month, at 410,000 AF; 370,000 AF; 270,000 AF and 260,000 AF. Doc. 281. In these calculations, Mr. Snow assumed that the X2 movement was to be eliminated. However, the RPM does not require elimination, it calls for minimization or elimination. While it is possible the effect of the X2 RPM may be as great as Mr. Snow opines, it is also possible that it would be significantly less. Mr. Bowling expresses his understanding that Reclamation must, in the event X2 moves upstream in excess of 0.5km, coordinate with the USFWS to determine what, if any, action is required. Doc. 290 at &7.

If changes in operations, such as additional upstream releases or reduced pumping, are necessary, Reclamation will determine if the changes are Aminor.@ *Id.* If they are more than minor, Reclamation will request reinitiation of formal consultation with the USFWS. Mr. Bowling notes that it Ais possible that the X2 RPM could require major changes in CVP operations.@ *Id.* Plaintiffs rely on the USFWS conclusion, that by using an Interagency team to evaluate and recommend changes in operations, Athe service has concluded there will not be an adverse modification or destruction of habitat for Delta smelt.@ USFWS BioOp, p. 30 (80-12-00). The defendants in substance say Atrust us.@ Yet Mr. Bowling declares, based on his experience, changes necessitated by the RPM X2 measures could include major changes in the dedication and management of (b)(2) water, in actions implemented with CALFED EWA, and that could impact available CVP operational flexibility. *Id.* at &8. Whether a major change in CVP operations will further directly impact south-of-delta water users through increased upstream releases and reduced delta pumping, or will impact other environmental programs or species through the use of the limited (b)(2) water account, remains undetermined. However, it is certain that potential major changes in CVP operations will occur in 20 percent of all Junes.

Water in the CVP is a limited resource, the right to which is constantly disputed. There are sixteen pending

lawsuits in this court, alone, in which numerous CVP stakeholders dispute their respective rights to annual CVP water allocations. Whenever CVP water is diverted to a different use, an impact is experienced throughout the system. The effects on the Preferred Alternative from the X2 RPM pose potential unquantified but significant environmental and other consequences. The conflict between USFWS= Ainsignificance@ opinion and the Bureau=s views of the FEIS=s X2 RPM consequences expressed by Mr. Bowling, are not addressed or resolved by defendants, making impossible a finding that further analysis of X2 RPMs was not required. It was arbitrary and capricious for the EIS and FEIS not to address impacts of X2 RPMs and CVP re-operation.

b. Supplemental EIS

Plaintiffs argue that the ROD should be set aside because Interior failed to prepare an SEIS assessing the BioOps= mitigation measure impacts, which were incorporated into the ROD and FEIS. An agency decision to forego completing an SEIS will not be set aside unless it is arbitrary and capricious. *Friends of the Clearwater*, 222 F.3d at 556. The applicable standard is whether the decision not to complete an SEIS was Abased on a consideration of the relevant factors and whether there has been a clear error of judgment.@ *Id.* AReview under this standard is to be searching and careful, but remains narrow, and a court is not to substitute its judgment for that of the agency.@ *Id.* (quoting *Mt. Graham Red*

Squirrel, 986 F.2d at 1571). AThis is especially appropriate where . . . the challenged decision implicates substantial agency expertise.@ *Id.*

ANormally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.@ *Motor Vehicle Mfrs. Ass'n*, 463 U.S. at 43; *O'Keeffe's*, 92 F.3d at 942. A[T]he agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made.@ *Motor Vehicle Mfrs.*, 463 U.S. at 43; *Dioxin/Organochlorine Ctr.*, 57 F.3d at 1525.

Here, Interior did not articulate a satisfactory explanation for its decision not to conduct an SEIS. After the October 12, 2000, BioOp Interior did not have time to do so. It simply rationalized that the new information included in the FEIS was Amainly for clarification purposes and does not represent significant new information requiring recirculation.@ FEIS D2-71. FEIS D2-72. Interior does not discuss why it believes that the Anew information@ is not significant. The expected effects of the X2 RPM and auxiliary bypass at the Trinity Dam RPM were not considered and the reason

for not doing so is implausible, which makes the action arbitrary and capricious. These RPMs must be considered in an SEIS which includes public participation.

Section 1502.9(c) provides that an agency shall prepare a supplement to a draft or final EIS if: 1) there are substantial changes in the proposed action that are relevant to the environmental concerns; or 2) there are environmentally relevant significant new circumstances or information that bear on the proposed action or its impacts. 40 C.F.R. ' 1502.9(c)(1). A[W]hether to prepare a supplemental EIS is similar to the decision whether to prepare an EIS in the first instance: If there remains >major Federal actio[n] to occur, and if the new information is sufficient to show that the remaining action will >affec[t] the quality of the human environment= in a significant manner or to a significant extent not already considered, a supplemental EIS must be prepared.@ *Marsh*, 490 U.S. at 374. A[T]he key to whether a Supplemental Environmental Impact Statement is necessary is . . . whether the proposed [work] will have a significant impact on the environment in a manner not previously evaluated and considered.@ *South Trenton*, 176 F.3d at 663.

The Bureau recognizes the X2 RPM, as described by the FEIS and the ROD, is a significant change. If the federal defendants had attempted to change the X2 standard as a separate action, an EIS would have been required. X2 has major environmental consequences, which

will require CVP reoperation if its limits are exceeded under the RPM. Interior cannot circumvent the requirement that an EIS recognize and analyze a major change by inserting it into an FEIS without analysis of, or public input on, its impacts. An SEIS must be completed analyzing all effects of the X2 RPM. In at least twenty percent (20%) of all water years, the X2 standard will be violated, necessitating CVP reoperation. What will be the RPMs? Where will the water come from to address the RPMs to mitigate the condition? How much CVP water will be required and how will such water be managed? What will be the likely impacts of required CVP reoperation on south-of-Delta species and what will other impacts be on the human environment and from reallocation of CVP water among other users?

C. Auxiliary Outlet Bypasses (Temperature and Power Ramifications)

The impacts of the auxiliary outlet bypass RPM to assist temperature control objectives were discussed in the FEIS, Appendix D 29, 79-91, in response to NCPA=s objection that the original Appendix F (addressing power impacts) failed to address power impacts of Aauxiliary outlet releases at Trinity Dam.@ The question is whether the information included in the FEIS represented a Asubstantial change@ or Asignificant new circumstances or information@ that Aprovides a seriously different picture of the environmental landscape.@ *City of Olmsted Falls, OH v. F.A.P.*, 292 F.3d 261, 274 (D.C. Cir. 2002); A[A]n

agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decisionmaking intractable, always awaiting updated information only to find the new information outdated by the time a decision is made.@ *Marsh v. Oregon Natural Resources Council,* 490 U.S. 360, 373 (1989). Plaintiffs argue that the impact of the auxiliary outlet bypass RPM was not sufficiently analyzed because the effect of the loss of energy on reliability of the California grid was not discussed. Plaintiffs are mistaken in part. The FEIS did cover and analyze ACVP Generation in Relation to Total California Generation and Demand.@ Appendix D2, 91-101. It did not do so specifically for the effect of Trinity Dam bypasses on Northern California CVP power supply and reliability.

Interior addressed the related issue of water temperature impacts from bypass operations to protect Trinity and Sacramento River fisheries. NCPA=s concern about bypassing the Trinity powerplant is specifically mentioned in Appendix D2, p. 81. An SEIS is required for the Trinity Dam bypass RPM because Interior did not analyze or address the measure and its impacts on Northern California poewr supply and reliability in the DEIS. Although the FEIS mentions the issue, it concludes without analysis, such operations will not cumulatively have adverse impacts, the unsupported conclusion is a post hoc rationalization. A hard look was required but not taken.

3. Analysis of Preferred Alternative Effect on Power System Reliability

The DEIS was published in October 1999 and the public comment period extended through January 20, 2000. All plaintiffs submitted comments. No public comments were permitted by Interior in the NEPA process after January 20, 2000. On June 28, 2000, the California Independent System Operator (AISO@) declared a Stage One Electrical Emergency for the third consecutive day. On August 3, 2000, the ISO declared a Stage Two Electrical Emergency for the fourth consecutive day, as part of a California energy crisis.

On August 23, 2000, the U.S. Department of Energy=s Western Area Power Administration (AWAPA@) wrote to Interior providing notice that Interior=s impact analysis for the Trinity River EIS and the CVPIA Programmatic EIS (APEIS@) only Afocused on the potential economic impacts to CVP power.@ AR 3923. It went on to state that A[t]hese impacts were studied with the implicit assumption that long-term power system reliability would not be a concern.@ *Id.* WAPA communicated its Abelief it was prudent to re-examine the work conducted in order to assess potential reliability impacts.@ *Id.* WAPA=s letter evaluated reliability impacts: from June to October of an average year, on-peak energy reductions would range from 27,000 MWh to 47,000 MWh compared to the No-Action alternative; in a dry year the reduction ranged from 2,000

MWh in October to 79,000 MWh in July. *Id.* at 3923-24. WAPA concluded: ADuring the critical summer months, the data indicates that as much as 124 MW of capacity supported with energy may be lost in September (of an average year) and up to 324 MW may be lost in July (of a dry year), as a result of reoperating the CVP to meet the requirements associated with both the PEIS and the Trinity River EIS/EIR.@ *Id.* at 3924. This power impact was characterized as Astriking@ by the Department of Energy. *Id.* at 3924.

On October 20, 2000 Interior published the FEIS. Five days later Interior rescinded the FEIS Notice of Availability and republished the FEIS November 17, 2000. On December 7, 2000 the California ISO declared a Stage Three Electrical Emergency. On December 10 and 11, 2000 the ISO declared Stage Two Electrical Emergencies. On December 14, 2000, the Department of Energy (ADOE@) declared an energy emergency in California and ordered electrical generation facilities to generate and transmit electric energy when and in such amounts as requested by the ISO. On December 19, 2000 the ISO declared a Stage Two Electrical Emergency and invoked its powers under the December 14, 2000 DOI order. On the same day, the Secretary of the Interior signed the ROD implementing the Preferred Alternative.

On January 17, 2001, the ISO declared a Stage Three Electrical Emergency followed by rolling blackouts January 17, 18, and March 19 and 20, 2001. The ISO declared a

Stage One Electrical Emergency July 9, 2002, and a State Two Electrical Emergency on July 10, 2002.

Plaintiffs argue that the ROD should be set aside because the FEIS does not realistically assess the impacts of the Preferred Alternative on power system reliability, requiring an SEIS. Defendants assert the FEIS and DEIS did analyze power system reliability and that no SEIS is required.

a. Discussion of Power Impacts in FEIS

The FEIS contains a section in its Power Analysis Thematic Response entitled ACVP Generation in Relation to Total California Generation and Demand.@ Appendix D2, 91-101. In this section, the FEIS opines that TRD-generated power produces capacity to supply approximately 1 percent of current California demand and will account for less than 1 percent of the projected 2010 demand. D2, 91-2. It also states that although demand growth has outstripped supply growth, completion of additional powerplants is anticipated to help avoid electrical emergency alerts in the future. The power generators argue Adetailed assessment@ of the impact of CVP power supplies on the greater California region was not conducted for the DEIS/EIR, other than presented in the socioeconomics section. 22 AR 13320, 13888.

The ROD states that Aoperating criteria will be developed@ to allow WAPA to respond to emergencies per obligations to the North American Electric Reliability

Council and Presidential Memo, of August 3, 2000, providing federal agencies work with California to develop backup power generation for power shortage emergencies. The thematic response concluded that: A[i]t is anticipated that as demand for power increases, additional power supplies will be built to meet the increase in total California demand. As this occurs, the CVP=s current total contribution of meeting 4 or less percent of total California electrical demand will constitute a decreasing proportion of the state=s overall power generation supply.@ FEIS, D2-92.

Other than this discussion, the only information that relates to the California energy crisis is the analysis included in both the DEIS and FEIS about the extent of decrease in power production under the various options to the State as a whole. This discussion was not related to system reliability, but to socioeconomics. The ROD results in decreased value of CVP power production of $5,564,000 annually under the Preferred Alternative, a 3% decrease of $9,024,000 annually. ROD at p. 22. Appendix F to the DEIS addresses power impacts as does Table 3-49 to the FEIS. See also TRFEFR, Appendix A, p.A.-12, Table 4, p.A.-17, which review the 1981 Secretarial Decision. The FEIS discusses the California power crisis; the issue is whether Interior took a Ahard look.@

EIS review is under the Arule of reason@ standard; *Churchill County,* 276 F.3d at 1071: AUnder this standard, we ask >whether an EIS contains a reasonably thorough

discussion of the significant aspects of the probable environmental consequences.@ *Id.* (quoting *Trout Unlimited,* 509 F.2d at 1283). To determine whether an EIS is reasonably thorough, courts must make Aa pragmatic judgment whether the EIS=s form, content and preparation foster both informed decision-making and informed public participation.@ *Id.* (quoting *Block,* 690 F.2d at 761).

When deciding NEPA claims, a court may not impose its own notion of which procedures are best. *Id.* at 1072. Instead, a court=s role is to insure the agency has taken Aa hard look.@ *Id.* A[NEPA] is not meant to >mandate particular results= but to provide a process to ensure that federal agencies take a >hard look= at the environmental consequences of proposed acts. When an agency makes a decision subject to NEPA's procedural requirements, >the only role for a court is to insure that the agency has considered the environmental consequences; it cannot interject itself within the area of discretion of the executive....=@ *Tillamook County,* 288 F.3d at 1143-44 (quoting *Strycker's Bay Neighborhood Council,* 444 U.S. at 227). Courts must strictly interpret the procedural requirements of NEPA A>to the fullest extent possible= consistent with the policies embodied in NEPA.@ *Churchill,* 276 F.3d at 1072. Pro forma compliance is not enough. *Id.*

Interior was informed by WAPA that Interior=s previous analysis of the power impacts was based upon an assumption that was no longer valid. Further analysis was

recommended. WAPA provides its own analysis in its letter that discusses the impacts of the Trinity River EIS and the FEIS. Interior responded to the WAPA letter, with a Amemorandum to file@ to document its position on the California power crisis: Ain 1999, all of the power generated by the Trinity River Division (TRD) relative to the total of recent power consumption in California shows that the TRD accounted for less than 0.70% than [sic] the total consumption and the change in power generated would result in an average decrease of 0.041% in an average water year, before accounting for new generating capacity.@ AR 17676. It noted that although implementation of the Preferred Alternative would result in only insignificant effects on power generation within California, the ROD must include a direction to Interior and WAPA to develop coordination measures to allow for increased generation of power during periods of critical shortfalls in California. AR 17677. Interior addressed WAPA=s concerns, determined that the impact of implementing the Preferred Alternative on the California energy crisis was minimal, but provided the ROD include a condition to develop measures for increased power generation during critical periods of energy shortfall. None of this additional Aconsideration@ was subject to public participation.

Interior took a look at the issue. Title 40 C.F.R. '1502.14 requires the look be reasonably thorough. Interior cannot be required to adopt measures other

stakeholders believe are prudent, except if reason and science make the agency=s choice arbitrary, capricious, or unlawful. Interior does not provide an analysis of the net effect of power impacts on Northern California in implementing the Prepared Alternative. Its process thwarted public participation and informed decision-making on power capacity and reliability issues. *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1336 (9th Cir. 1992). Although Appendix D responds to many issues raised by the power generator plaintiffs, ultimately, Interior=s finding that the Preferred Alternative=s effect on California power generation from the CVP will be minimal and that its response to power emergency situations will comply with the Presidential Memo of 8/3/00, cannot be tested based on the AR. A Ahard look@ at relevant power supply and reliability consequences requires an SEIS.

The power generator plaintiffs also argue that the DEIS analysis of the Preferred Alternative did not focus on its impact on power system reliability. Not surprisingly, the electricity power grid in California is a function of power supply and demand. The government submits a declaration from Mr. Marcus, responding to Mr. Dame=s declaration on behalf of the power generator plaintiffs. Even if both declarations are considered because they aid in understanding the complex and technical issues surrounding the way in which hydroelectric poewr generating capacity of the CVP is affected by the Preferred Alternative, both as it relates

to state-wide power demand and Northern California power demand, such information needed to be part of the NEPA review. Defendants point to Appendix F and attachment F1, which analyze the impact of the Trinity River alternatives on the balance between power supply and demand, as evidence the capacity issue was considered. The analysis includes changes to CVP supply (project capacity) and CVP demand (project use) and considers the effect of dry-year monthly capacity changes. The DEIS observes that peak power loads occur in summer months, which are most sensitive to reduced capacity. Additional months, January - March and December are also periods of increased power use. The DEIS concludes the Preferred Alternative would increase dry year capacity on the average 6.5 Mw over the No Action Alternative. The most significant month, December, shows a reduction of capacity by 85 Mw, in excess of the 50Mw level of significant change in capacity, which is provided for in the FEIS and ROD by an emergency provision. Contrary to Plaintiffs: assertion, Interior did consider evolving circumstances as pertinent to power generation and reliability, revised the ROD accordingly, but acknowledged regional and local effects require further analysis. 27 AR 17676-89, 17691-92; May 23, 2002, California energy Commission letter.

Extra-record references are made to a briefing memo prepared for the Secretary of the Interior as of December, 2000, and California Energy Commission Scoping Comments, which identify 2592 Mw of new power generating capacity in

operation (not dependent upon hydro power) and another 13,867 Mw of power generation capacity under construction, 3,213 Mw of which are expected to be operational by the end of 2002. An additional 9,980 Mw of power generation capacity are in licensing. Marcus Dec. & 21, California Energy Commission Comments pp. 6-7. The experts do not agree. Their differing opinions reflect contrary scientific viewpoints that do not require a choice. Interior:s conclusion that negative impacts on power generation capacity will be offset by resource development may be valid, however, it was not subjected to public scrutiny.

Friends of the Clearwater v. Dombeck, 222 F.3d 552, 558 (9th Cir. 2000), involved a 10 year old, out-of-date EIS. Here the lawsuit was initiated upon completion of the FEIS and before the ROD was signed. Interior should have performed an SEIS to address the effect on Northern California power supply and reliability resulting from implementation of the Preferred Alternative in view of major changes associated with the California energy crisis.

b. Supplemental EIS re: Energy Impacts

An agency decision to forego completing an SEIS will not be set aside unless it is arbitrary and capricious. *Friends of the Clearwater*, 222 F.3d at 556. The court must consider whether the decision not to complete an SEIS was Abased on a consideration of the relevant factors and

whether there has been a clear error of judgment.@ *Id.* AReview under this standard is to be searching and careful, but remains narrow, and a court is not to substitute its judgment for that of the agency.@ *Id.* (quoting *Mt. Graham Red Squirrel*, 986 F.2d at 1571). AThis is especially appropriate where . . . the challenged decision implicates substantial agency expertise.@ *Id.*

The FEIS discusses the impact of implementing the Preferred Alternative on the developing California energy crisis. The agency determined that Ain 1999, all of the power generated by the Trinity River Division (TRD) relative to the total of recent power consumption in California accounted for less than 0.70% of the total consumption and the change in power generated would result in an average decrease of 0.041% in an average water year, before accounting for new generating capacity. AR 17676. Interior decided that despite the seriousness of the 2001 energy crisis, it was not a significant new circumstance because any reduction in energy production which would be caused by implementation of the Preferred Alternative would be so small. Interior=s determination that the 2001 California energy crisis was not a sufficiently significant factor as to require a supplement to the DEIS, can only be overturned if it was a clear error in judgment. A court may not substitute judicial judgment for that of the agency.

The information in the FEIS is not sufficient to permit informed analysis of the ultimate effects of the California energy crisis. All the information bearing on the analysis is extra-record and has been submitted in the form of conflicting declarations in the lawsuit. The CVP makes an allegedly Aminor@ contribution to the annual California energy supply and implementing the Preferred Alternative is alleged to have less than a .05% effect on the California power supply. Interior=s view that ongoing new development of California power generation capacity will ameliorate reduction in CVP power generation capacity caused by implementing the ROD is not challenged. Defendants= extra-record arguments about evolving knowledge of alleged market fraud and manipulation by power suppliers in 2000-2001 were not known or available to Interior in December 2000 and cannot be considered.

Even though supplemental analysis would likely favor Interior=s position that CVP power supply impacts are not significant, for the additional reason that the California power shortages were, in some measure, caused by fraud and market manipulation, the Administrative Record has not been supplemented. Even if the parties= declarations are considered for technical assistance, they are not dispositive. AThe complete record@ does not assuage the concerns about significant change wrought by the energy crisis or the need for an SEIS on the power effects issue.

Plaintiffs= motion for summary judgment on the issue of the federal defendants= failure to comply with NEPA

based on analysis of the Preferred Alternative=s effect on power system supply and reliability is GRANTED. The federal defendants= motion on the same issue is DENIED.

4. Timing of EIS and the Trinity River Flow Evaluation Final Report

Plaintiffs argue that an FEIS should have been completed on the TRFES before the final report on the study was published. Resolution of this issues raises two questions: 1) was the Trinity River Flow Evaluation Final Report (ATRFEFR@) a major federal action; and, 2) if so, was the FEIS prepared in a timely manner.

a. Major Federal Action

NEPA requires that an EIS be prepared for all Amajor federal actions.@ 42 U.S.C. ' 4332(2)(C). A*Major Federal action* includes actions with effects that may be major and which are potentially subject to Federal control and responsibility.@ 40 C.F.R. ' 1508.18 (emphasis in original). It includes, *inter alia*, A[a]doption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of federal resources, upon which future agency actions will be based.@ *Id.* at 1508.18(b)(2).

The first seven chapters of the TRFEFR include the introduction, background, historical perspective, study approaches, results, and restoration strategies. Chapter Eight is entitled Arecommendations.@ The executive summary

of the TRFEFR describes the purposes of each chapter. Chapter 8 contains recommendations Ato utilize an Adaptive Environmental Assessment and Management (AEAM) approach to guide future management and ensure the restoration and maintenance of the fishery resources of the Trinity River@ and to use Ainstream flow, channel-rehabilitation, and fine and course sediment@ recommendations in order to implement Chapter Seven=s Aconclusion that a modified flow regime, a reconfigured channel, and strategy for sediment management are necessary to have a functioning alluvial river . . . that will provide the diverse habitats required to restore and maintain the fishery resources of the Trinity River.@ TRFEFR at 227, 230. The summary of the recommendations chapter also describes the integration of these three primary actions: ARehabilitation of the mainstem Trinity River and restoration and maintenance of its fishery resources requires (1) increased annual instream volumes and variable reservoir release schedules, (2) fine and coarse sediment management, and (3) mainstem channel rehabilitation. *Id.* at 233. The first of these recommendations are the increased flows adopted in the DEIS, FEIS, and ROD.

CVPIA Section 3406(b)(23) required Interior to complete the TRFES and make recommendations to Congress and the Hoopa Tribe for permanent instream fishery flows by fall 1996. The government cannot plausibly argue that the TRFEFR, which compiled all the data regarding the Trinity River restoration and recommended a modified flow

regime that reallocates up to over 815,000 AF of CVP water to the Trinity River, does not constitute a recommendation on a proposal for major federal action. Doc. 136 at 42:21-43:1. Section 3406(b)(23) directs that the Secretary make recommendations for increased flows. After forwarding the recommendations to Congress, the Secretary had two options: 1) to concur; or, 2) not to concur. If the Secretary and the Hoopa Valley Tribe (with whom the Secretary must consult on the TRFES) concurred, the recommendations were to be implemented. The recommendations of the TRFEFR were designed to guide how Interior uses federal resources; and future agency action was likely to be based upon these recommendations. The TRFEFR constitutes the A[a]doption of [a] formal plan[], such as [an] official document[] prepared or approved by [a] federal agenc[y] which guide[s] or prescribe[s] alternative uses of federal resources, upon which future agency actions will be based.@ *See* 40 C.F.R. ' 1508.18(b)(2). This is major federal action; Interior recognized its responsibility to prepare an EIS and did so.

b. Timeliness of EIS Preparation

CEQA regulations address the time for EIS preparation. AAn agency shall commence preparation of an environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal (' 1508.23) so that preparation can be completed

in time for the final statement to be included in any recommendation or report on the proposal. The statement shall be prepared early enough so that it can serve practically as an important contribution to the decisionmaking process and will not be used to rationalize or justify decisions already made.@ 40 C.F.R. ' 1502.5 (emphasis added). APreparation of an environmental impact statement on a proposal should be timed (' 1502.5) so that the final statement may be completed in time for the statement to be included in any recommendation or report on the proposal.@ 40 C.F.R. ' 1508.23. Here, the draft TRFEFR (a report on a proposal) was released in January 1998 and the final TRFEFR was published in June 1999. Four months later, in October 1999, the DEIS was released. The public comment period on the DEIS extended to January 20, 2000. On March 29, 2000, Interior forwarded the TRFEFR to Congress pursuant to CVPIA ' 3406(b)(23). Eight months later, on November 17, 2000 the FEIS was published. On December 18, 2000, the Hoopa Valley Tribe concurred in the TRFEFR=s recommendations and on December 19, 2000, the Secretary and the Hoopa Valley Tribe signed the ROD.

Section 3406(b)(23)=s requirements made the flow recommendations in the TRFEFR a critical decisionmaking point. Once the Secretary made recommendations in the TRFEFR, the Tribe could concur in them (and they would be implemented), or not concur, which would leave flows at the statutory minimum level (340,000 AF) pending further legislative or judicial action. The point in time at

which the Secretary had the broadest discretion to determine flow levels was the point at which the TRFEFR recommendations were made. That was the point in time at which the FEIS should have been completed so that the EIS could have had an effect on the decisionmaking. The government argues an FEIS was not required before the TRFEFR was submitted to Congress because it was a programmatic and project-specific EIS. FEIS pp. 1-3.

ANEPA procedures must insure that the environmental information is available to public officials and citizens before decisions are made and before actions are taken.@ 40 C.F.R. ' 1500.1(b); *Northwest Res. Info. Ctr.*, 56 F.3d at 1064 (AThe purposes of an EIS are to provide decisionmakers with sufficiently detailed information to aid in determining whether to proceed with the action in light of its environmental consequences and to provide the public with information and an opportunity to participate in the information gathering process.@). The FEIS was not prepared before the Final Flow Recommendations were submitted to Congress. All components of the Flow Study and Restoration Plan were incorporated into the ROD and the FEIS. When the TRFEFR was submitted in March 2000, Congress had the DEIS, but not the FEIS. It was not required that a separate EIS be completed at every stage of the project. At least two of Plaintiffs= major concerns, power impacts and Integrated Management Alternative were not fully considered in the DEIS provided to Congress. A related contention, that Interior

improperly narrowed the range of alternatives considered to meet the initial 1996 statutory deadline is treated below. 2 AR 632, 659.

5. EIS Alternatives

Plaintiffs complain the EIS violated NEPA because it did not examine a reasonable range of alternatives and that the ROD must therefore be set aside. This argument has four premises: 1) the various laws applicable to the management of the CVPIA and the restoration of the Trinity River require that only enough water be devoted to accomplish Trinity River fishery restoration as necessary and no more; 2) based on this interpretation of the governing law, Interior failed to consider a reasonable range of alternatives; 3) an AIntegrated Habitat and Fishery Management@ alternative is an important reasonable alternative, used on other rivers, that must be considered; and, 4) the EIS unlawfully constrained the range of options by concentrating on increased water flows and channel restoration to ignore any integrated management alternative that incorporated non-flow management measures.

a. Statutory Mandate

Plaintiffs argue that CVPIA Ageneral@ provisions in Sections 3402 and 3406 limit Section 3406(b)(23) water releases to only the amount necessary to achieve the restoration purposes of the 1984 Act and Ato the extent

restoration reasonably can be accomplished by means other than flows, the Secretary must at least *consider* utilizing such other means,@ but did not do so. (Emphasis in original). Doc. 233 at 17:11-14 (SMUD motion).

i. Statutory History

The Trinity River Division was authorized in 1955 by Public Law 84-386 (A1955 Act@). AFor the principal purpose of increasing the supply of water available for irrigation and other beneficial uses in the Central Valley of California, the Secretary of the Interior, acting pursuant to the Federal reclamation laws . . ., is authorized to construct, operate, and maintain, as an addition to and an integral part of the Central Valley Project, California, the Trinity River division . . .@ Pub. L. No. 84-386, 69 Stat. 719 (1955). Section 2 of the 1955 Act provides:

> Subject to the provisions of this Act, the operation of the Trinity River division shall be integrated and coordinated, from both a financial and an operational standpoint, with the operation of other features of the Central Valley Project, as presently authorized and as may in the future be authorized by Act of Congress, in such manner as will effectuate the fullest, most beneficial, and most economic utilization of the water resources hereby made available: *Provided,* that the Secretary is authorized and directed to adopt appropriate measures to insure the preservation and propagation of fish and wildlife, including, but not limited to, the maintenance of the flow of the Trinity River below the diversion point at not less than one hundred and fifty cubic feet per second . . .

Id. at ' 2 (emphasis added). The Senate Report on the 1955 Act notes that the Adevelopment of the Trinity River was planned with a view to maintaining and improving

fishery conditions. . . and requires that the project be operated so as to insure the preservation and propagation of fish and wildlife.@ S. Rep. No. 84-1154, at 5 (1955); H. Rep. No. 84-602, at 4 (1955).

In 1984, Congress passed the Trinity River Basin Fish and Wildlife Management Act (A1984 Act@) to restore fish and wildlife populations to pre-TRD levels. The 1984 Act found Athe construction of the Trinity River division of the Central Valley Project in California, authorized by the Act of August 12, 1955 (69 Stat. 719), has substantially reduced the streamflow in the Trinity River Basin thereby contributing damage to pools, spawning gravels, and rearing areas and to a drastic reduction in the anadromous fish populations. . . .@ Pub. L. No. 98-541 ' 1(1) (1984). It recognizes the 1955 Act directed the Secretary of the Interior Ato take appropriate actions to ensure the preservation and propagation of such fish and wildlife.@ *Id.* at ' 1(3). In order to restore the fish populations to the levels approximating those that existed immediately prior to TRD construction, the Secretary was directed to formulate and implement a fish management program that would include the following components:

> (1) The design, construction, operation, and maintenance of facilities to --
> (A) rehabilitate fish habitats in the Trinity River between Lewiston Dam and Weitchpec;
> (B) rehabilitate fish habitats in tributaries of such river below Lewiston Dam and in the south fork of such river; and
> (C) modernize and otherwise increase the effectiveness of the Trinity River Fish Hatchery.

(2) The establishment of a procedure to monitor (A) the fish and wildlife stock on a continuing basis, and (B) the effectiveness of the rehabilitation work.
(3) Such other activities as the Secretary determines to be necessary to achieve the long-term goal of the program.

Id. at ' 2(a).

In 1992, Congress enacted the CVPIA. Pub. L. No. 102-575, 106 Stat. 4600 (1992):

(a) to protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
(b) to address impacts of the Central Valley Project on fish, wildlife and associated habitats;
(c) to improve the operational flexibility of the Central Valley Project;
. . . .
(f) to achieve a reasonable balance among competing demands for use of Central Valley Project water, including the requirements of fish and wildlife, agricultural, municipal and industrial and power contractors.

Pub. L. No. 102-575, ' 3402 (1992).

Section 3406(a) amended the CVP Authorization Act of August 26, 1937 by, *inter alia*, inserting the following sentence: AThe mitigation for fish and wildlife losses incurred as a result of construction, operation, or maintenance of the Central Valley Project shall be based on the replacement of ecologically equivalent habitat. . . .@ It also added the mitigation, protection and restoration of fish and wildlife as one of the purposes of the CVP.

CVPIA Section 3406(b) addresses fish, wildlife, and habitat restoration. It begins with a general statement that: AThe Secretary . . . shall operate the Central Valley Project to meet all obligations under State and

Federal law, including but not limited to the Federal Endangered Species Act, 16 U.S.C. 1531, et seq., and all decisions of the California State Water Resources Control Board establishing conditions on applicable licenses and permits for the project.@ *Id.* at ' 3406(b). It then lists twenty-three specific actions the Secretary is to take.

Section 3406(b)(23) provides that an instream flow of not less than 340,000 AF of water shall be released each year from the Trinity River Division for the purposes of fishery restoration, propagation, and maintenance. Section (b)(23) directs the Secretary to complete the TRFES Ain a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery.@ Pub. L. No. 102-575 ' 3406(b)(23)(A). Section (b)(23)(B) directs the Secretary to forward the TRFES to Congress and if the Secretary and the Hoopa Valley Tribe concur in the TRFES: recommendations, to implement the instream fishery releases to meet the fishery restoration goals of the 1984 Act. Section (b)(23) has an express, further purpose to meet federal trust responsibilities to the Hoopa Valley Tribe.

In 1996, Congress amended the 1984 Act. Congress directed that Trinity River restoration was to be measured

not only by returning adult anadromous fish spawners, but also by the ability of dependant tribal, commercial, and sport fisheries to participate fully, through in-river and ocean harvest opportunities, in the benefits of the restoration. Pub. L. No. 104-408 (1996). Congress added language that amended the activities that were to be undertaken by the Secretary. *Id.* The original language directed the Secretary to Amodernize and otherwise increase the effectiveness of the Trinity River Fish hatchery. The 1996 Act added Aso that it can best service its purpose of mitigation of fish habitat loss above Lewiston Dam while not impairing efforts to restore and maintain naturally reproducing anadromous fish stocks within the basin.@ *Id.*

Contrary to the EIS management team=s scope definition, the restoration of the TR fishery goes beyond the Trinity mainstem fishery to fish stocks within the Trinity River basin and to habitats in tributaries and the south fork of that river below Lewiston Dam. ' 2(a)(1)(B).

ii. Plaintiffs= AOnly Enough Necessary@ Argument

Plaintiffs argue the various laws applicable to CVP management and TR restoration require that only enough water be devoted to TR restoration as necessary and no more. Specifically, they contend that CVPIA sections 3402(f) and 3406(b) require balancing all the competing interests of CVP water users and such balancing

necessarily limits the amount of CVP water restored to Trinity River. Section 3402 and the prefatory provisions of Section 3406(b) are general provisions, controlled by the more specific provisions found in the subsections of Section 3406(b). *Westlands*, 43 F.3d at 461-62. Section 3406(b)(23) directs that the TRFES be completed and that it make recommendations, based on the best available scientific data, for permanent fishery flow requirements. The volume of flows is to be determined by the Secretary.

What water is necessary for restorative instream flows is not a subject to be second-guessed by a court unless Interior=s decision is arbitrary, capricious, or unlawful. *Morongo Band of Mission Indians v. Fed. Aviation Admin.*, 161 F.3d 569, 576 (9th Cir. 1998) (A[W]here an issue requires >a high level of technical expertise, we must defer to the informed discretion of the responsible federal agencies.=@) (quoting Marsh, 490 U.S. at 377). SMUD argues that the limited alternatives considered, impermissibly constrained Interior from formulating and analyzing a multi-purpose alternative: restore the fishery and secondarily protect the needs of all other CVP users. Citing *Greenpeace v. Nat=l Marine Fisheries Servs.*, 55 F.Supp.2d 1248 (W.D. Wa. 1999) (EIS/R that did not evaluate as an alternative, integrated total allowable fish catch with other management measures; such as location and timing of fishery, year types and groupings, product quality, habitat alteration, and

markets, prevented decision-makers from making fully informed choice).

SMUD=s fourth and fifth claims assert Interior abdicated its obligations under the CVPIA and other federal reclamation law to manage the Trinity River division for multiple purposes to effectuate the most beneficial and economic utilization of Trinity River water; to meet requirements of the 1984 TR Management Act; and to achieve reasonable balance among multiple interests that depend on CVP water. CVPIA ' 3406(2)(f). The first assertion that permanent annual flow volumes cannot be Ascientifically justified@ is not supported by science or history. The Trinity River has been actively studied for over 20 years and the proposed implementation of flow volumes to restore the river is variable to the extent of the water year class. Habitat restoration focuses on channel rehabilitation efforts.

The ROD=s permanent variable annual aggregate flow volume is fixed without regard to actual future experience. Interior is the manager of the CVP and has discretion to determine the timing and volume of water releases throughout the water year; to incorporate additional objectives beyond restoring and maintaining the fishery; i.e., to meet reservoir storage requirements; management of peak flows for hydropower production, flood control releases to serve safety; and to manage annual available CVP water supply to satisfy contractual obligations. The adoption of finite annual

aggregate flow release volumes to be retained within the Trinity Basin is rationally related to the Bureau=s management function to restore the fishery and facilitates planning and annual publication of available water from all CVP storage reservoirs.

Choosing a new flow regime that divides approximately 50% of Trinity River flows north of Lewiston Dam between the Trinity and Sacramento River Basins, instead of the historical average of 75% to 90% diversion to the Sacramento Basin and south, since TRD completion in 1964, is not per se irrational, arbitrary, or capricious to implement the congressional mandate to restore and maintain the Trinity River fishery. The adopted schedule retains approximately 48% of Trinity River water for restoration in the Trinity mainstem between Lewiston Dam and Weitchpec, with 52% released to the Sacramento River Basin for the benefit of Central Valley species and users, including SMUD. The restoration standard has been set to approximate pre-TRD conditions. The ultimate NEPA issue centers on whether the intentional narrowing of the EIS purpose to concentrate on increased water flows and channel rehabilitation prevented the decision-maker and the Court from assessing the utility of a variable flow alternative that uses non-flow measures to serve all the statutory objectives of the 1984 Act as amended, the CVPIA, and the secondary purposes of minimizing effects on all other CVP water users.

c. Legal Interpretation at EIS Purpose

SMUD recounts the dispute over the purpose of the EIS that developed within the Management Team. In essence, the view that prevailed was based on a legal interpretation of the 1984 Act and the CVPIA, separating the CVPIA flow minimums and final study requirements to the exclusion of P.L. 98-541's requirement to modernize and otherwise increase the effectiveness of the Trinity River hatchery as part of the broad objective to formulate and implement a fish and wildlife management program for the Trinity River basin to restore fish and wildlife populations to the levels approximating those which existed immediately prior to the start of construction of the Trinity River Division.

Contrary to the constricted EIS purpose used, the 1984 Act, Pub. L. 98-541, ' 1(5), 99 Stat. 2721 (October 24, 1984) directed a A[Trinity River] Basin-wide fish and wildlife management program,@ to be achieved by formulating and implementing a plan to restore fish and wildlife populations to pre-Trinity River Division levels. The October 30, 1992, CVPIA mandated minimum annual 340,000 AF flows Ato meet the fishery restoration goals@ of the 1948 Act and a completed Trinity River Flow Evaluation Study by December 1996, through recommendations for permanent instream fishery flow requirements and Trinity River Division Operating Criteria and Procedures to restore and maintain the Trinity River fishery. ' 3406(b)(23)(A). Unambiguous statutory language requires

permanent Trinity River restoration flows and TRD operating criteria and procedures. The 1984 Act was reauthorized in 1996 by statutory amendment.

As a matter of statutory interpretation, the CVPIA specific minimum flows and direction to formulate permanent TR restoration flows and TRD operating criteria and procedures, take precedence over more general language of the 1984 Act. *Edmund v. United States*, 520 U.S. 651, 657 (1997); *In re Padilla*, 222 F.3d 1184, 1192 (9th Cir. 2000) (where specific and general statute addresses same subject matter, specific takes precedence regardless of sequence of enactment and must be applied first). However, the ›84 Act goal of achieving pre-TRD levels of fish and wildlife in the Trinity Basin, not just the Trinity River mainstem, was not repealed or modified and was re-emphasized and further defined in the 1996 Act. The CVPIA includes a balancing of competing demands for use of CVP water objectives, which, although secondary to the more specific restoration goals of (b)(23), should have been given consideration in the NEPA review because (b)(23) also refers to the ›84 Act as restoration authority. The management team=s pre-litigation legal interpretation, narrowing the EIS purpose, is entitled to no judicial deference, because it is not reasonable and ignores the additional statutory goals of improving not only the mainstem, but also tributaries and south fork, and balancing competing CVP uses. The CVPIA does not narrow the legislative purpose of Trinity River

restoration, which remains basin-wide, and does not include only the TR mainstem between Lewiston Dam and Weitchpec.

b. Range of Alternatives

Plaintiffs argue that Interior=s EIS did not consider a sufficient number of different alternatives. This issue turns in part on the purpose of the EIS, which, according to Interior, is Ato carry out the Congressional directive in subsection (b)(23) of the CVPIA to assess environmental issues, alternatives and impacts associated with the restoration of natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam.@ Aug. 20, 2002 hearing at 6:1-6 (Mr. Shockey).

SMUD agrees that the EIS=s purpose is to restore anadromous fish in the Trinity River and that the directive is to accomplish this goal by increased flows, as (b)(23) provides for permanent instream fishery flow requirements. SMUD argues that the range of alternatives, to achieve this purpose was too narrow and arbitrary because lower flows could have been recommended if non-flow restoration measures were integrated with flow measures. SMUD complains the TRFES wrongfully adopts an Aecological perspective philosophy@ which abandons basin-wide considerations to concentrate on maximized fixed flow requirements which prevent applying integrated management measures to address constantly changing hydrological conditions.

The Water Districts argue that Interior improperly substituted the statutory goal of restoring the fishery with a Adynamic alluvial river objective.@ Aug. 20, 2002 hearing at 18:5 (Mr. O=Hanlon). The water districts= argument is essentially that added Ariver objectives@ are not required in the selection of alternatives. They argue this caused Interior to only consider flow-related alternatives to the exclusion of an Integrated Management Alternative proposed by SMUD=s expert. This part of the controversy centers on the Arestore and maintain a >healthy= Trinity River in part by establishing >healthy river= objectives based on >known and presumed attributes of the pre-dam Trinity River.=@ DEIS 1, 12-13.

C. Legal Interpretation of EIS Purposes

SMUD points to the early dispute over the purpose of the EIS that developed within the EIS Management Team. The approach that prevailed was based on the team=s legal interpretation of the 1984 Act, CVPIA, and 1996 Act, that separated the CVPIA flow minimums and final study requirements, to the exclusion of the >84 and >96 Acts= broader purposes, which include an integrated 16-point Trinity River Fish and Management program covering water flows, sediment management, tributaries rehabilitation, hatchery modification, and stream and land use management. The adopted EIS purpose also rejected the statutory direction to modernize and otherwise increase the effectiveness of the Trinity River hatchery as part of the

broad statutory objective to formulate and implement a fish and wildlife management program for the Trinity River basin, (AR 27289) which would restore the fish and wildlife populations in the basin to the levels approximating those which existed immediately prior to the start of construction of the Trinity River Division.

SMUD points to letters and memoranda evidencing that legal advisors to the EIS management team intentionally narrowed and limited the scope and content of the EIS to ultimately focus only on increased flows and channel restoration of the mainstem Trinity River below Lewiston Dam and Weitchpec, purposefully ignoring the rest of the Trinity River basin, tributaries, south fork, and impacts on other CVP uses and users. In intentionally limiting the scope of the EIS, the EIS managers recognized time was short and they improperly sought to attenuate the range of alternatives considered to restrict public participation and to permit completion of the ROD within the then-perceived 1996 time deadline.

SMUD further argues that by seizing on the reference to Anatural@ fish restoration, which appears in (b)(23) the legal advisors manipulated the EIS= focus to ignore Trinity River Fish Hatchery improvements, measures other than flow releases, and improperly locked-in an excessive permanent flow regime adopted by the ROD, ignoring non-flow alternatives as additional means to achieve restoration. Defendants acknowledge that the ROD relies on experimental, untested

methodology, which Awill be evaluated in the future.@ (AR 623, 587-90, 92-94, 623-24, 632, 636-37, 639-40, 643, 652, 661, 733, 770, 778, 804-07).

SMUD asserts no deference is owed to the pre-litigation legal position here taken by Interior, even if it interprets legislation the agency implements. *Gilliland v. E.J. Bartells Co., Inc.*, 270 F.3d 1259, 1262 (9th Cir. 2001) (litigation position entitled to deference only if reasonable). Ultimately, the narrowing and limitation of the alternatives considered to increased permanent flows, channel restoration, minor watershed protection, consisting of sediment-control measures already in place and road de-commissioning, resulted in an EIS that did not adequately or honestly consider whether an integrated management alternative, based on stream restoration science presently utilized by Interior that integrates multiple approaches to fishery restoration that would take into account the overall effect on other CVP users.

SMUD contends that the ROD is arbitrary and capricious because its recommended permanent flows are hypothetical, untested, and unreliable. No matter what actual experience and adaptive management proves, the ROD has permanently locked-in and prohibits change in flow volumes below its established minimum flows for each annual hydrologic year-type. Interior neither explains nor analyzes the failure to consider an integrated

management alternative with secondary objectives to minimize impacts on other CVP users.

i. The Law

An EIS must discuss reasonable alternatives to a proposed action. *American Rivers v. Fed. Energy Regulatory Comm=n*, 201 F.3d 1186, 1201 (9th Cir. 1999); 42 U.S.C. ' 4332(2)(C)(iii). Section 1502.14 of the CEQ regulations requires agencies to A[r]igorously explore and objectively evaluate all reasonable alternatives,@ to include a Ano action@ alternative, and a preferred alternative. 40 C.F.R. ' 1502.14. However, agencies are not required to include Aevery alternative device and thought conceivable by the mind of man.@ *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 551 (1978). AThe range of alternatives that must be considered in the EIS need not extend beyond those reasonably related to the purposes of the project.@ *Laguna Greenbelt, Inc. v. Dep=t of Transp.*, 42 F.3d 517, 524 (9th Cir. 1994).

When determining whether a reasonable range of alternatives was considered, the Atouchstone@ is whether the EIS's Aselection and discussion of alternatives fosters informed decision-making and informed public participation.@ *Headwaters, Inc. v. Bureau of Land Management, Medford Dist.*, 914 F.2d 1174, 1180 (9th Cir. 1990) (quoting *Block*, 690 F.2d at 767). NEPA does not require the consideration of alternatives: whose effect

cannot be reasonably ascertained; whose implementation is remote or speculative; which are infeasible, ineffective, or inconsistent with basic policy objectives; or which are not significantly distinguishable from alternatives actually considered, or; which have substantially similar consequences. *Id.* at 1180-81. However, Aan agency cannot define its objectives in unreasonably narrow terms@ to restrict the range of reasonable alternatives. *City of Carmel-By-The-Sea v. Dep=t of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997). The Arule of reason@ guides both the choice of alternatives and the extent to which an EIS must discuss each alternative. *American Rivers,* 201 F.3d at 1201.

Interior observes it has concurrent discretion to determine how best to restore the Tribes= reserved fishing rights in the Trinity River as part of the express federal trust obligation to the Indian Tribes, in part defined in the 1996 amendment of the 1984 Act. *Parrows v. Babbitt,* 70 F.3d 539, 542 (9th Cir. 1995).

ii. Alternatives Considered

The DEIS identified four alternatives to meet the statutory purpose, goals, and objectives: 1) Maximum Flow, dedicating all Trinity River flows above Trinity Dam to fishery restoration; 2) Flow Evaluation, utilizing managed flows and mechanical rehabilitation; 3) Percent Inflow reducing released water into the Trinity River at forty per cent of the rate it flows into the Trinity Reservoir;

and 4) Mechanical Restoration, using mechanical means to alter the river channel and create fish protection habitat. DEIS at 2-1. In addition to these four alternatives, measures including ANo Action,@ Amaintaining the status quo,@ and AState Permit,@ reducing annual 340,000 AF flows to 120,500 AF, the level specified in Interior=s 1959 water permits, were also analyzed. *Id.* The State Permit Alternative was analyzed as a standard against which to compare other alternatives, because it is the baseline for state permitting purposes. *Id.* However, it is not viable as it calls for flows less than the statutory minimum.

The Maximum Flow Alternative Awould use all of the Trinity River inflows above Trinity Dam to restore the river ecosystem through managed flows, which would include periodic peak flow releases.@ DEIS at 2-11. No mechanical restoration would be carried out. *Id.* at 2-12. The Flow Evaluation Alternative is based on the TRFES recommendations. *Id.* at 2-16. Forty-seven mechanical rehabilitation projects would be constructed under this alternative. *Id.* at 2-21. The Percent Inflow Alternative Awould approximate natural flow patterns, at a reduced scale, by releasing water into the Trinity River at a proportion of the rate it flows into Trinity Reservoir.@ *Id.* at 2-22. The water released would approximate 40 percent of the previous week=s inflow. This option would include the same mechanical channel restoration projects as the Flow Evaluation Alternative. *Id.* at 2-25. The

Mechanical Restoration Alternative maintains instream flows at 340,000 AF/year and depends on mechanical means to restore the fish population. *Id.* at 2-26. It would include watershed protection measures, forty-seven channel rehabilitation projects, and dredging of ten potential pools. *Id.* at 2:29-30. The State Permit Alternative would reduce the flows to 120,500 AF/year as specified in Reclamation=s state water permits. *Id.* at 2-31. No mechanical restoration projects would be undertaken. *Id.* The No Action Alternative Arepresents ongoing activities and operations@ and reflects conditions in the year 2020. *Id.* at 2-4. It assumes ongoing watershed protection measures will continue and that current habitat improvement projects and programs, including the maintenance of twenty-seven existing channel rehabilitation projects, will also continue. *Id.* at 2-7-8.

In addition to the alternatives discussed in the DEIS, the agency severally considered and discussed, but rejected without detailed analysis, the following measures: 1) removal of Trinity and Lewiston Dams; 2) harvest management; 3) fish passage facilities; 4) trucking fish around the dams; 5) predator control; 6) increased hatchery production; 7) pumped storage; and, 8) channel augmentation using Weaver Creek. DEIS at 2-35-42. Removal of the dams was not considered viable because of environmental impacts and foregone benefits and costs. The Harvest Management Alternative was rejected because

habitat, and not the number of spawning adults, was the limiting factor in natural production of anadromous fish. Even with harvesting restrictions and increased spawning escapement, natural fish production declined. *Id.* at 2-39. The Predator Control Alternative was rejected for the same reason. *Id.* at 2-40. Increased hatchery production was rejected because it did not increase the number of Anaturally@ reproducing anadromous fish. *Id.* at 2-41. SMUD complains it was error to separately analyze and reject each management measure as a stand-alone alternative and not as an integrated plan.

The Preferred Alternative was the Flow Evaluation Alternative with additional watershed improvements described in the Mechanical Restoration Alternative. DEIS at 2-3. The Preferred Alternative was selected using six screening criteria: 1) substantially increases natural production of anadromous fish on the Trinity River; 2) substantially restores both inriver and ocean fishing opportunities; 3) improves tribal access to trust resources; 4) balances environmental and social impacts; 5) allows for continued operation of the TRD; and, 6) limits flooding. *Id.*

iv. Were Sufficient Alternatives Considered?

Plaintiffs contend the EIS too narrowly focused on alternatives designed to increase flows, improve habitat

and summarily rejected alternatives that could not by themselves restore fish populations.

A. Focus of EIS

Plaintiffs complain the lead agencies exclusively focused on alternatives designed to alter the geomorphic environment of the Trinity River. The purpose of the EIS is to Arestore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam.@ Plaintiffs are correct that the alternatives analyzed by the EIS are all directed at restoring the mainstem Trinity River fish habitat below Lewiston Dam. For instance, harvest management was rejected because the preliminary analysis showed that limited habitat, not harvest restrictions, was the reason for the fishery=s decline. AThe results of the analysis indicated that although spawner escapement increased due to increasing harvest restrictions, natural production, as indicated by the production index, actually decreased. . . . The lack of a positive response (i.e., increase in production) with increasing harvest restrictions was due to the current quantity and quality of anadromous fish habitat in the Trinity River.@ DEIS at 2-39. Predator control was rejected for the same reason. *Id.* at 2-40. Increased hatchery production was rejected because A[e]vidence shows that increasing hatchery production can significantly impair efforts to restore and maintain naturally reproducing fish stocks. *Id.* at 2-41.

Agencies are not required to consider options that conflict with basic policy objectives. *Headwaters,* 914 F.2d at 1180-81. Here, the purpose of the EIS was to restore Anaturally@ reproducing anadromous fish in the Trinity River mainstem downstream of Lewiston Dam, not just increase fish population. In addition, the 1996 Act limited the use of hatchery production by requiring that it not impair efforts to restore and maintain Anaturally@ reproducing anadromous fish stocks in the basin. Pub. L. No. 104-143, at ' 3(c). SMUD complains that science recognizes that integrated management applied in combination in limited degrees, including hatchery production, harvest management and predator control, will enhance fishery restoration efforts while affording protection to other CVP uses. Interior has the discretion not to use such measures as stand-alone alternatives; however, Plaintiffs are correct that Interior did not take a hard look at, or consider in depth, a fully integrated management alternative that reduced variable flow increases in conjunction with other management prescriptions. Because NEPA requires fair consideration of reasonable (feasible) alternatives, including discussion of the alternatives and opposing viewpoints, to avoid undue narrowing of the means of achieving the purpose of an EIS, an SEIS should have been prepared. *City of Carmel-by-the-Sea v. U.S. Dept. Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1999); cited in *American Rivers v. F.E.R.C.*, 201 F.3d 1186, 1200 (9th Cir. 1999).

b. Rejection of Stand-Alone Alternatives that Could Not Restore Fish Populations

Plaintiffs complain the EIS considered each potential restorative alternative standing alone without combining them into an Integrated Management Plan. Specifically they object that the Harvest Management and the Hatchery Management alternatives were not combined with lower flows in a separate alternative. To the extent this argument is related to these two specific alternatives, they have been discussed.

c. Integrated Management Alternative

Plaintiffs argue, based on the post-ROD expert opinion of Dr. Hanson, that an Integrated Management Alternative was essential to reasonableness of the range of alternatives; should have been analyzed as a reasonable alternative; and failure to do so was arbitrary, capricious, or unlawful. Plaintiffs point to the 1984 Act which directs the Secretary to take an integrated approach to restoring the Trinity River. However, the disputed EIS is not the first EIS on the Trinity River restoration. An EIS was completed in 1983 on the Trinity River Basin Fish and Wildlife Management Program. DEIS at 1-12. The 1984 Act was passed to give the Secretary the authority to implement that plan. Pub. L. No. 98-541, at ' 1(6). This followed Interior=s Solicitor=s opinion, citing legislative

history, that the 1955 Act authorized the Permit, and required instream flow needs in the Trinity River Basin to be met before water was exported.

The current EIS evaluates and analyzes the mechanical river restoration projects and the TRFES= recommendation and alternatives. Interior objects to SMUD=s Integrated Management Alternative claiming it was not presented in the NEPA public comment period; *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519, 551-53 (1978), yet nonetheless responds on the merits. The declaration of Dr. Hanson is considered to aid the Court in understanding applicable river restoration science and to assist the evaluation whether Integrated Management alternative was reasonable and should have been considered and discussed.

When determining whether a reasonable range of alternatives was considered, the Atouchstone@ is whether the EIS's Aselection and discussion of alternatives fosters informed decision-making and informed public participation.@ *Headwaters,* 914 F.2d at 1180. NEPA does not require the consideration of alternatives whose effect cannot be reasonably ascertained; whose implementation is remote or speculative; which are infeasible, ineffective, or inconsistent with basic policy objectives, or; which are not significantly distinguishable from alternatives actually considered or which have substantially similar consequences. *Id.* at 1180-81. However, Aan agency cannot define its objectives in unreasonably narrow terms@ to

avoid a range of reasonable alternatives. *City of Carmel-By-The-Sea,* 123 F.3d at 1155. The EIS should analyze and consider the Afull spectrum.@ The Arule of reason@ guides the choice of alternatives. *American Rivers,* 201 F.3d at 1201.

The plaintiffs argue that the EIS had to consider an alternative that restored TR anadromous fish while minimizing the effect on competing CVP uses. Plaintiffs= proposed Integrated Management Alternative involves: A(1) instream and watershed habitat protection; (2) instream and watershed habitat restoration and improvement; (3) hatchery management and stock supplementation; (4) predator control; (5) inland and ocean harvest; (6) water quality control; and, (7) land management within the watershed and along the stream channel corridor, as well as other elements.@ Doc. 236 at & 4 (Hanson Decl.). SMUD=s comments on the DEIS raised 67 points. App. D3-2579 to 2646. Interior responded to each, either directly or by reference in thematic responses included in the FEIS, but as stand-alone measures, not as an integrated plan.

SMUD=s proposed alternative combines increased flows with a variety of mechanical restoration measures. The Preferred Alternative does combine increased variable annual flow releases from Lewiston Dam, coarse sediment introduction, mechanical channel rehabilitation and adaptive management, which includes watershed protection. All alternatives were analyzed assuming that the current

fish population management programs would continue. The relevant statutes and Interior=s preliminary findings limit the applicability of harvest management and hatchery management. Ultimately, plaintiffs seek the absolute minimum increase of flow and a greater proportion of mechanical restoration and watershed management through hatchery and harvest management, predator control and other non-flow means, in contrast with the Preferred Alternative. Interior disagrees and supports its opposing view with the Trush, & 4, and Polos declarations. The latest input purports to respond to plaintiffs= proposed alternatives, but not in the context of NEPA public comment to permit informed decision-making. The absence of public participation, full consideration, or discussion in the NEPA process of an Integrated Management Alternative, that sought to minimize impacts on other CVP users, requires an SEIS.

D. Method of Selection

Plaintiffs assert the method used to select the Preferred Alternative preordained the alternative chosen. Specifically, Interior used the Trinity River System Attribute Analysis Methodology (ATRSAAM@) to create the Preferred Alternative and then applied it to choose among options which included only one viable choice, the Preferred Alternative.

The fishery restoration analysis in the EIS used the same Ahealthy river@ attributes employed by the TRFES.

However, the EIS analyzed the alternatives not only against those attributes, but other criteria as well. The Preferred Alternative was selected using six screening criteria: 1) substantially increases natural production of anadromous fish on the Trinity River; 2) substantially restores both inriver and ocean fishing opportunities; 3) improves tribal access to trust resources; 4) balances environmental and social impacts; 5) allows for continued operation of the TRD; and, 6) limits flooding. DEIS at 2-3. Although Plaintiffs do not contend that the screening criteria used are arbitrary or irrational, nor that each criteria does not serve the statutory fishery restoration purpose; they msintain no realistic alternative was provided.

E. Reasonableness of Alternatives

Plaintiffs argue the only viable alternative analyzed was the Flow Evaluation Alternative, because the other Areasonable@ alternatives were Astrawmen.@ The EIS identified four Areasonable alternatives:@ Maximum Flow; Flow Evaluation; Percent Flow, and; Mechanical Restoration, along with a no action alternative. Eventually a combination of the Flow Evaluation and the Mechanical Restoration alternatives was selected as the Preferred Alternative. Plaintiffs contend the alternatives wrongfully focused solely on increased flows and flow-related measures to the exclusion of non- or reduced-flow alternatives.

The Maximum Flow Alternative would release all water that flows into the Trinity River above Lewiston Dam. Plaintiffs argue that this is a Astraw@ alternative because it is the functional equivalent of removing the Dam, which was rejected prior to analysis by the agency. All water that enters the reservoir would be released under this alternative, so the only difference between it and Trinity Dam removal is that the dam would remain in place. Interior determined removal of the dams was impractical because of environmental impacts, foregone benefits, and removal costs. Some of these concerns are the same as those raised by the Maximum Flow Alternative, but the costs related to the two alternatives are not co-extensive. While the Maximum Flow Alternative is at the end of the spectrum of reasonableness, it evaluates conditions under maximum potential flow condition.

Plaintiffs maintain the Percent Flow and Mechanical Restoration alternatives were not viable because they could not meet the ten attributes of a healthy river. The ten attributes of a healthy river were not the only criteria which drove selection of the Preferred Alternative. While the Flow Evaluation Alternative may have had an advantage under the healthy river criteria, other issues were considered. The Mechanical Restoration Alternative incorporates physical improvements to the river to maximize beneficial effects on fish habitat.

Plaintiffs suggest the Percent Flow Alternative was a Astrawman@ because it could not be implemented based on the

statutory requirement that a minimum of 340,000 AF of water be released into the Trinity River each year. Section (b)(23) provides that A[i]f the secretary and the Hoopa Valley Tribe concur in these recommendations, any increase to the minimum Trinity River instream fishery releases established under this paragraph and the operating criteria and procedures referred to in subparagraph (A) shall be implemented accordingly.@ The Percent Flow Alternative does not meet the 340,000 AF minimum in dry and critically dry years. At oral argument, the federal defendants argued that this did not make the option unreasonable because the Secretary could change the alternative by requiring that mandatory minimum flows be released during dry and critically dry years. The point of the EIS is to inform the public and the Secretary of the reasonable alternatives available and the impacts of those alternatives. A Percent Inflow Alternative that included 340,000 AF in dry and critically dry years is different from one that does not have this requirement. An EIS alternative that is inconsistent with and violates a statutory minimum flow mandate is not reasonable, because it assumes a flow condition that could not be implemented absent Congressional action to amend the CVPIA. This alternative was not reasonable because it could not be implemented.

f. Lower Flow Evaluation Alternative

Plaintiffs argue that the EIS itself suggests a lower flow alternative exists. The TRFEFR lists ranges of water flows that could possibly achieve the healthy river objectives. The report selected a number from within this range. Plaintiffs argue that there should have been more than one flow evaluation alternative analyzed in the EIS based on these numbers, i.e., one that was at the lower end of the range.

A[A]n agency's consideration of alternatives is sufficient if it analyzes an appropriate range of alternatives, even if it does not consider every available alternative.@ *Headwaters,* 914 F.2d at 1181. Alternatives that are not significantly distinguishable from an alternative already considered need not be analyzed. *Id.* The ranges contained in the TRFEFR are for peak flows in the various water year types. The difference between the lowest number in the range and the number selected by the TRFES is: 3,000 cfs in extremely wet years; 2,500 cfs in wet years; 1,000 cfs in normal years; 800 cfs in dry years, and; 200 cfs in critically dry years. These peak flows are to run for five-days under all water year types except in critically dry years in which the peak flow would run for 36 days. The total difference between the amount analyzed under the Flow Evaluation Alternative and the lowest possible flow alternative suggested by plaintiffs is 15,000 cfs in extremely wet years; 12,500 cfs in wet years; 5,000 cfs in normal years; 4,000 cfs in dry years, and; 7,200 cfs in critically dry years. In

aggregate terms, the increased flow volumes serve purposes in addition to fishery restoration and maintenance, including flood control, reservoir storage limits, and dam safety.

g. Conclusion - Range of Alternatives

Upon close analysis, Interior in actuality considered three options for Trinity River fishery restoration: The Maximum Flow Alternative (the maximum increase in CVP water to the Trinity River); the Flow Evaluation Alternative (mid-range alternative), and; the Mechanical Restoration Alternative (the minimum amount of water). This range of alternatives consisted of two extreme endpoints and one mid-range alternative, which pre-ordained the selection. Plaintiffs argue that there should have been more mid-range alternatives considered, i.e., at the least an alternative that utilized Integrated Management methods, including non-flow measures, based on available science and existing fishery restoration methods used in the Lower Mokelumne River Management Plan, the joint CALFED/SJRMP San Joaquin River Fishery Technical Team Workshop Report and other restoration planning on the Sacramento-San Joaquin Rivers and Delta. Such an analysis would have permitted a hard look at Plaintiffs: contention that an Integrated Management approach would best serve the interests of the Trinity River fishery, the CVP, and all other CVP stakeholders.

Considering only one reasonable alternative prevented Aselection and discussion of alternatives [to] enable informed decision-making and informed public participation.@ *Headwaters,* 914 F.2d at 1180; *California v. Block*, 690 F.2d 753, 766-67 (9th Cir. 1982). The selection criteria used to chose the Preferred Alternative, a flow-driven regime in the TR mainstem, which purposefully avoided restoration by non-flow methods, even if reasonably calculated to achieve the statutorily defined objective was premised on an unduly, narrowly-defined EIS purpose. Other reasonable options exist, as SMUD suggests lower flows combined with increased mechanical restoration, fishery management, predator control, harvest management, and related measures should have been the subject of a hard look. At oral argument the federal defendants raised another option, the Percent Inflow Alternative with the dry and critically dry year flows at the 340,000 AF floor.

The range of alternatives considered was not adequate. Developing fish passage facilities, trucking fish around dams, predator control, a pumped storage project and channel augmentation at Weaver Creek were considered, individually, and rejected as stand-alone measures under the soporific, such consideration achieved Aclarity,@ DEIS 2:2-3; Interior also avoided analysis of Ameasures that would be addressed by other natural resource agencies.@ FEIS D3:2587. DEIS 2, 35-42, FEIS App. 2, 49. The inclusion of one mid-range option with

two relatively unrealistic alternatives dictated the option selected. Plaintiffs= contention that the EIS should have been prepared with multiple purposes which included gauging permanent increases of CVP water allocated to the Trinity River to minimize impacts on all other CVP users has merit. Interior was required to take a hard look at such a reasonable alternative and it did not.

Ultimately, the amount of water permanently rededicated to the Trinity River to achieve fishery restoration is committed to the joint discretion of Congress, Interior, and the Tribes to be implemented under Interior=s CVP management operational discretion. Interior=s Preferred Alternative and ROD adopt a permanent and immutable dedication of CVP water to the Trinity River Mainstem, without the searching and objective analysis NEPA requires. If Interior is wrong, the permanent flows cannot be changed without Congressional action, if such flows are excessive or unnecessary. Harm is visited upon other CVP interests when water is reallocated. Although Interior did consider mechanical channel restoration, watershed restoration, and Aadaptive management,@ the public and all other CVP stakeholders were entitled to have their input timely considered and to have Interior take a hard look, at the least, at a multiple purpose alternative that integrated restoration management methods with secondary objectives set forth in the restoration statutes. The failure to do so violates NEPA.

Plaintiffs= motion for summary adjudication on the issue of the federal defendants= failure to reasonably scope the purpose of the EIS and to comply with NEPA based on the unreasonably narrow range of alternatives considered is GRANTED. Defendants= cross-motion on the issue is DENIED.

C. ENDANGERED SPECIES ACT

Section 7 of the ESA, 16 U.S.C. ' 1536, requires that federal agencies Ain consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical, unless such agency has been granted an exemption. . . .@ 16 U.S.C. ' 1536(a)(2). When an agency requests formal consultation under Section 7(a)(2), a formal report, called a biological opinion, is prepared giving the USFWS=s or the NMFS=s opinion about whether the agency action is Alikely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.@ 16 U.S.C. ' 1536(b)(3); 50 C.F.R. ' 402.14(h). AJeopardize the continued existence of@ means engaging in Aan action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and

recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.@ 50 C.F.R. ' 402.02. If jeopardy is likely, the report is called a Ajeopardy biological opinion.@ 50 C.F.R. ' 402.14(h)(3). If the action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat, the report is called a Ano jeopardy biological opinion.@ *Id.*

A jeopardy opinion must consider, and if lawful include, reasonable and prudent alternatives (ARPAs@). 16 U.S.C. ' 1536(b)(3)(A) (AIf jeopardy or adverse modification is found, the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a) (2) of this section and can be taken by the Federal agency or applicant in implementing the agency action.@); 50 C.F.R. ' 402.14(h)(3). RPAs are Aalternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action; that can be implemented consistent within the scope of the Federal agency's legal authority and jurisdiction; that [are] economically and technologically feasible; and, that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or result[] in the destruction or adverse modification of critical habitat.@ 50 C.F.R. ' 402.02.

Where the USFWS or NMFS concludes the agency action and any resultant incidental take will not violate Section 7(a)(2) of the ESA, the Service must include within the opinion an incidental take statement that, *inter alia*, specifies reasonable and prudent measures (ARPMs@) that are necessary or appropriate to minimize such impact. 16 U.S.C. ' 1536(b)(4)(C)(ii); 50 C.F.R. ' 402.14(i). The incidental take statement (ITS) must also specify Athe terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency or any applicant to implement the [RPMs].@ 50 C.F.R. ' 402.14(i)(1)(iv). RPMs are Aactions . . . necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take.@ 50 C.F.R. ' 402.02. AReasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes.@ 50 C.F.R. ' 402.14(i)(2).

The issuance of biological opinions, RPMs and ITSs by Interior through the FWS, is final agency action under 16 U.S.C. ' 1536, subject to judicial review. Challenges to agency action under the ESA are governed by the APA. *Arizona Cattle Growers' Ass'n v. U.S. Fish & Wildlife*, 273 F.3d 1229, 1236 (9th Cir. 2001). An agency=s decision may not be overturned by the court unless it is arbitrary and capricious. *Id.* AAs long as the agency decision was based on a consideration of relevant factors and there is

no clear error of judgment, the reviewing court may not overturn the agency's action.@ *Id.*

Plaintiffs argue that the federal defendants committed two ESA violations: 1) the USFWS BioOp unlawfully mandates major changes in CVP operations, even if the Trinity River restoration actions will not jeopardize any listed species; and, 2) the NMFS BioOp arbitrarily mandates the implementation of the ROD=s instream flow releases in the absence of lethal take of Trinity River fish. Westlands contends NEPA compliance was required before biological opinions issued which authorized incidental take of Sacramento winter-run chinook salmon, Sacramento splittail, and delta smelt, citing *Ramsey v. Kantor*, 96 F.3d 434, 437, 444. Defendants correctly cite *Southwest Center for Biological Diversity v. Keasse*, CV-S-97-1969 GEB JFM (E.D. Ca 1998), which holds that FWS is not required to file NEPA documents every time it issues a biological opinion or an incidental take statement. *Id.* (*Ramsey* characterized the ' 7 ITS as the Afunctional equivalent@ of a ' 10 permit).

1. USFWS Biological Opinion

The USFWS BioOp is a Ano jeopardy opinion.@ AR 17536. After determining that the Preferred Alternative will not jeopardize listed species, the BioOp included, as required, an incidental take statement. The following RPM was a part of the incidental take statement:

> Reclamation shall minimize the effects of reoperating the CVP resulting from the implementation of the Preferred Alternative

within the Trinity river basin on listed fish in the Delta. . . . These terms and conditions are non-discretionary. To implement Reasonable and Prudent Measure number one Reclamation must implement the following:

> $ If Reclamation in its annual operations planning process detects that implementation of the Preferred Alternative will result in an upstream (eastward) movement of X2 in any month between February 1 through June 30 of 0.5 km, Reclamation shall incorporate within its operating plan measures that can and will be implemented to minimize or eliminate such upstream movements.

AR 17537-38 (emphasis added). Contrary to the government=s contention that no requirement exists that Interior prevent upstream movement of X2, the need to control movement of X2 has the potential to require major changes in CVP operations with corresponding significant impacts. The parties do not dispute that an RPM may not mandate major changes. 50 C.F.R. ' 402.14(i)(2) (AReasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes.@) (emphasis added). An agency=s action may be set aside if it is not in accordance with the law. *In re Transcon Lines*, 89 F.3d 559, 563 (9th Cir. 1996). The USFWS exceeded its

authority in mandating the X2 RPM because it was not legally authorized to require implementation of an RPM that would result in the major changes Mr. Bowling recognizes re-operation of the CVP will necessitate in twenty percent of all water years. Interior provides no analysis of what the X2 RPMs will be or their consequences in those years. The X2 RPM is a major change that cannot lawfully be adopted by a BioOp without NEPA compliance.

Defendants also note that the RPM calls for FWS and the Bureau to work cooperatively in dry and critically dry years Ato develop temperature objectives in the Trinity and Sacramento Rivers, which will Anot mandate any operational changes.@ This is directly contradictory to Mr. Bowling=s opinion that major changes in CVP operations will be needed in short water years, which are 20% of water years. Plaintiffs= summary adjudication motion as to the X2 RPM in the USFWS BioOp is GRANTED, this RPM must be set aside. The federal defendants= motion on this issue is DENIED.

2. NMFS Biological Opinion

Plaintiffs argue that there are three problems with NMFS= BioOp: 1) under the ESA, RPMs can only be mandated if there was a finding of Aincidental take@ and that NMFS did not make such finding; 2) even if there was a finding of incidental take the RPMs are not reasonably calculated to reduce the take related to gravel placement; and, 3)

the RPMs cannot mandate the implementation of the action upon which the consultation is based.

a. Finding of Incidental Take

The NMFS may only impose RPMs when there is evidence that the agency action will result in a Atake.@ *Arizona Cattle Growers= Ass=n,* 273 F.3d at 1246 (A[A]n Incidental Take Statement must be predicated on a finding of an incidental take.@). AWithout evidence that a take would occur as a result of [the agency=s action], issuing an Incidental Take Statement imposing conditions on the otherwise lawful use of land was arbitrary and capricious.@ *Id.* at 1246. AIncidental take@ is defined as Atakings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant.@ 50 C.F.R. ' 402.2. ATake@ means Ato harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.@ 16 U.S.C. ' 1532(19).

> The NMFS BioOp found:
> The NMFS does not anticipate that implementation of the proposed flow schedules will incidentally take any SONCC coho salmon. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the 47 channel rehabilitation projects may be temporarily degraded due to localized turbidity and potential fine sedimentation of channel substrate during construction activities. However, the amount of habitat temporarily degraded due to these localized effects is negligible compared to the long-term creation of additional suitable habitat along approximately 40 miles of the Trinity River. Although placement of spawning gravel in the Trinity River may temporarily displace (harass) an unknown number of juvenile coho salmon to

alternative habitats, this is not expected to result in lethal take of these fish.

AR 17491. Plaintiffs argue that the NMFS findings do not show that the coho salmon would be Aharmed@ by implementation of the ROD. Defendants argue that the NMFS BioOp made a finding that ROD construction activities would result in either Aharm@ or Aharassment.@

i. Harm

Harm is defined as Aan act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.@ 50 C.F.R. ' 222.102.

Plaintiffs opine NMFS did not find that any coho salmon would be killed or injured by the proposed action; citing NMFS: conclusion that A[a]lthough there may be minor, short lived adverse effects to juvenile coho salmon as a result of the gravel supplementation projects, long-term results such as improved spawning habitat, improved salmonid over-wintering habitat, and a net increase in aquatic insect production in the immediate and downstream areas are expected to provide survival benefits to Trinity River coho salmon populations.@ AR 17478. Plaintiffs are correct that NMFS found that implementation of the Preferred Alternative would benefit coho salmon as a

whole. However, they confuse the benefit/harm to the coho salmon population as a whole with the benefit/harm to individual members of the species.

The NMFS found that the Preferred Alternative would not result in jeopardy, i.e., that the species as a whole would not be harmed. However, it also found that the mechanical restoration measures of the Preferred Alternative might Akill@ individual members of the species. AReduced egg to fry survival may occur as a result of fine sediment deposition downstream of a project site.@ AR 17477. An incidental take statement and RPMs are concerned with reducing the number of individuals effected by the action, not the survival of the species as a whole.

ii. Harassment

AHarass@ as included in the definition of Atake@ is not defined by statute, but legislative history describes Congress= intent: A[Take] includes harassment, whether intentional or not. This would allow, for example, the Secretary to regulate or prohibit the activities of birdwatchers where the effect of those activities might disturb the birds and make it difficult for them to hatch or raise their young.@ H.R. Rep. 93-412, at 11 (1973). NMFS has not defined the meaning of Aharass,@ however the USFWS has. The USFWS defines Aharass@ as Aan intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which

include, but are not limited to, breeding, feeding, or sheltering.@ 50 C.F.R. ' 17.3.

The NMFS found: A[c]oho salmon fry and possibly late outmigrating smelts may be displaced from the gravel deposition site due to the placement of gravel into the river and/or the noise from heavy machinery. Displaced juveniles are expected to seek alternative downstream or upstream habitats for rearing.@ AR 17477-78. The NMFS also found A[a]lthough placement of spawning gravel in the Trinity River may temporarily displace (harass) an unknown number of juvenile coho salmon to alternative habitats, this is not expected to result in lethal take of these fish.@ AR 17491. The disruption of coho salmon to the extent that they migrate to another area of the river is sufficient to rise to the level of Aharassment.@ This is so even if the disruption is temporally limited. ATake@ is concerned with the effect on individual species members, not necessarily on the survival of the species as a whole.

Plaintiffs argue that defining Aharass@ to include habitat modification would make the use of the term Aharm@ in the statutory definition of Atake@ a nullity. Congress Aintended >take= to apply broadly.@ *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687, 704 (1995). A>Take= is defined . . . in the broadest possible manner to include every conceivable way in which a person can >take= (harass) or attempt to >take= any fish or wildlife.@ S. Rep. No. 93-307, 1973 U.S.C.C.A.N. 2989,

2995 (1973); H.R. Rep. No. 93-412, 11 (1973) (ATake= is defined broadly.@).

Congress meant each term in the definition of Atake@ Ato serve a particular function in the ESA, consistent with, but distinct from, the functions of the other verbs used to define >take.=@ *Sweet Home*, 515 U.S. at 702. In defining Aharm,@ the Supreme Court noted:

> In contrast, if the statutory term "harm" encompasses such indirect means of killing and injuring wildlife as habitat modification, the other terms listed in ' 3--"harass," "pursue," "hunt," "shoot," "wound," "kill," "trap," "capture," and "collect"--generally retain independent meanings. Most of those terms refer to deliberate actions more frequently than does "harm," and they therefore do not duplicate the sense of indirect causation that "harm" adds to the statute. In addition, most of the other words in the definition describe either actions from which habitat modification does not usually result (e.g., "pursue," "harass") or effects to which activities that modify habitat do not usually lead (e.g., "trap," "collect"). To the extent the Secretary's definition of "harm" may have applications that overlap with other words in the definition, that overlap reflects the broad purpose of the Act.

Id. at 698 n.11.

The use of the term Aharass@ in this situation does not make the term Aharm@ a nullity. AHarm@ is Aan act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.@ 50 C.F.R. ' 222.102. Harassment on the other hand occurs when an act annoys fish to the point where they significantly modify their

behavior. These definitions, while similar, are different. Although in certain circumstances the two definitions will overlap, mutual exclusivity of the terms defining Atake@ is not required. ATo the extent the Secretary's definition of >harm= may have applications that overlap with other words in the definition, that overlap reflects the broad purpose of the Act.@ *Id.* at 698 n.11. A finding of Aharassment@ in this situation does not nullify Aharm.@ Interior did not err.

b. Relation of RPM to ATake@

Plaintiffs argue that the only incidental take found by NMFS was that related to gravel displacement and that Terms and Conditions 1.a. and 1.b. are not rationally related to reducing the take that would occur as a result. The first RPM in the NMFS incidental take statement requires Interior to A[i]mplement the flow regimes included in the proposed action (as described in TRMFR DEIS, page 2-19, Table 2-5) as soon as possible.@ AR 17492. To implement that RPM, Interior is directed to comply with three terms and conditions, the first two of which are in dispute here:

> 1.a. Following completion of the Record of Decision addressing the proposed action, Reclamation shall immediately implement the components of the proposed flow schedule (as described in the TRMFR DEIS, page 2-19, Table 2-5) equal to or less than 6,000 CFS, and implement the entire flow schedule as soon as possible (i.e., after infrastructure modifications are completed);
> 1.b. As necessary infrastructure modifications are made, Reclamation shall incrementally implement higher Trinity River flows (consistent with the proposed flow regime), e.g.,

> potentially release up to 8,500 CFS after some bridge modifications, but prior to completion of the ABucktail@ and APoker Bar@ bridge replacements.

AR 17493.

An incidental take statement may specify RPMs that the agency Aconsiders necessary or appropriate to minimize@ the incidental taking of the species. 50 C.F.R. ' 402.14(i)(1)(ii). Term and conditions that must be complied with in order to implement the RPMs must also be set out. 50 C.F.R. ' 402.14(i)(1)(iv). RPMs are only required if they are necessary or appropriate to minimize incidental take.

Here the incidental take will result from Atemporarily degraded [conditions] due to localized turbidity and potential fine sedimentation of channel substrate during construction activities.@ AR 17491. Plaintiffs argue that the first two terms and conditions do not address this harm. In doing so they note that the biological assessment performed by Reclamation and USFWS found that increased flows would actually increase Aturbidity.@ The biological assessment found Ahigher dam releases will produce a marked increase in sediment transport downstream resulting in increased turbidity levels due to scour.@ AR 18354. However, it also found that the Abench flows@ in the Preferred Alternative would Apromote[] transport of fine sediment.@ AR 18352. Although the prescribed terms and conditions may make one of the problems associated with channel rehabilitation worse, i.e., turbidity, they may improve sedimentation,

the other problem identified in the incidental take statement. On matters of scientific expertise courts should defer to the agency=s expertise. *Marsh*, 490 U.S. at 377 (ABecause analysis of the relevant documents >requires a high level of technical expertise,= we must defer to >the informed discretion of the responsible federal agencies.=@) (quoting *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976)). NMFS=s opinion is entitled to deference as to take resulting from gravel displacement.

c. Requiring Flow Increases as an RPM

Plaintiffs object that the NMFS exceeded its authority by requiring, as an RPM, that the Preferred Alternatives= flows be implemented. The purpose of consulting with the NMFS was to comply with Section 7 of the ESA which requires agencies to, Ain consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined . . . to be critical, unless such agency has been granted an exemption. . . .@ 16 U.S.C. ' 1536(a)(2).

The disputed action is the implementation of the Preferred Alternative. Essentially what NMFS did was require that the Preferred Alternative be implemented to minimize the effects of implementing the Preferred

Alternative. This is not a permitted function of a RPM. Incidental take statements are intended to determine if an agency=s actions will jeopardize a listed species. The purpose of an RPM is not to require that an agency take the very action upon which consultation has been initiated. Moreover, the evidence in the record shows the Preferred Alternative was not necessary to mitigate the incidental take, which did not require all the flow volumes or rehabilitation measures it recommends.

By requiring the Preferred Alternative be implemented to minimize the effects of implementing the Preferred Alternative, the NMFS exceeded its statutory authority. That increased flows and channel rehabilitation may mitigate the effects of the preferred alternative is circular. Even if the evidence does not support a finding that recommended habitat improvement will be lethal to juvenile coho salmon, the AR does find evidence of harassment which qualifies as take. Although this is not a ground on which to invalidate the disputed RPM, no deference is owed to NMFS=s RPM that the Preferred Alternative be implemented. Plaintiffs= motion for summary adjudication to set aside the RPM in the NMFS BioOp requiring implementation of the Preferred Alternative=s flows is GRANTED. The federal defendants= motion on the same issue is DENIED.

D. ADMINISTRATIVE PROCEDURES ACT

Section 706 of the Administrative Procedures Act (AAPA@) directs courts to Ahold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.@ 5 U.S.C. ' 706(2); *Ninilchik Traditional Council v. United States*, 227 F.3d 1186, 1193 (9th Cir. 2000). This standard is deferential and is intended to Aensure that the agency considered all of the relevant factors and that its decision contained no >clear error of judgment.=@ *Pacific Coast Fed=n of Fishermen's Ass'n, Inc. v. Nat=l Marine Fisheries Serv.*, 265 F.3d 1028, 1034 (9th Cir 2001) (quoting *Arizona v. Thomas*, 824 F.2d 745, 748 (9th Cir. 1987)). AAgency action should be overturned only when the agency has >relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.=@ *Id.* (quoting *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). Judicial review must be A>searching and careful= but remains narrow as we are not to substitute our judgment for that of the agency's.=@ *Ninilchik*, 227 F.3d at 1194 (quoting *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971)). ADeference to an agency's technical expertise and experience is particularly warranted with respect to

questions involving engineering and scientific matters.@ *United States v. Alpine Land & Reservoir Co.*, 887 F.2d 207, 213 (9th Cir. 1989); *Ninilchik*, 227 F.3d at 1194.

Plaintiffs argue that Interior=s decision to adopt the ROD was arbitrary and capricious because it locked in permanent instream flows for the Trinity River although the science upon which those flows were based is uncertain. They advance two primary contentions: 1) that the flows were impermissibly selected from an unnecessarily high range; and, 2) that the science underlying the decision was inherently uncertain because the ROD=s analysis acknowledges that future effects cannot be determined and will require further study and response.

1. Selection of Flow Amounts Within a Range

The flow study ranges, which are variable by five water year types, ranging from critically dry to extremely wet, derived from a scientifically conducted study designed to ascertain what annual instream flow levels were likely to achieve Trinity River fishery restoration. That science could not pinpoint the exact minimum amount necessary, year by year, under constantly changing hydrologic conditions, does not make Interior=s decision per se arbitrary and capricious. Courts are particularly deferential in scientific matters where the agency has expertise. *Ninilchik*, 227 F.3d at 1194. Interior=s approach locks in permanent flows at a minimum annual flow level, without analysis of variable flows that utilize all

available restorative means and without considering secondary CVP interests. The statute requires a permanent Trinity river restoration to approximate pre-TRD conditions. This is not a subject suited for second-guessing. However, Interior=s choice of flow levels did not include a level of analysis that considered non-flow measures or secondary statutory objectives.

2. Uncertainty of the Underlying Science

Plaintiffs argue that the Secretary=s decision was arbitrary and capricious because it locked in permanent fixed amounts of water that are to be released in each water year type, even though the science that purports to measure the necessity of those amounts was not certain. Plaintiffs contend Appendices N and O to the TRFEFR show that the ROD is a Amajor experiment in fluvial geomorphology.@ Doc. 233 at 39:2 (SMUD Motion).

Appendix N describes the Adaptive Environmental Assessment and Management (AAEAM@) program. It recognizes that Aalluvial river systems are complex and dynamic. There are not many unambiguous clear-cut answers to complex hydraulic, channel-structure, and water quality changes . . .@ and that Athe information we base our decisions on is almost always incomplete.@ TRFEFR at N-2. Appendix O discusses the hypotheses used, potential competing hypotheses, management objectives, what is known specifically about the Trinity River, and the major unknown or unquantified issues that needed to be

addressed. *Id.* at O-2. An agency decision is not arbitrary or capricious because the agency recognizes the limitations of the information upon which it bases a decision. The fact that Interior has acknowledged it will learn new facts in the future, that river flow management is dynamic, and climatic conditions, upon which CVP water supply depend, uncertain, are indicative of a reflective decisionmaking process, not arbitrariness.

The requirements of the 1984 Act and the CVPIA do not change this. They mandate restoration of the Trinity River to approximate pre-Trinity River Division fish and wildlife levels. The TRFES addresses a portion of the 1984 Act=s broader objectives along with the specific objectives of the CVPIA. CVPIA section 3406(b)(23) directs Interior to complete the TRFES by 1996 Ain a manner which insures the development of recommendations, based on the best available scientific data, regarding permanent instream fishery flow requirements and the Trinity River Division operating criteria and procedures for the restoration and maintenance of the Trinity River fishery.@ (emphasis added). The CVPIA requires that the Abest available scientific data@ be used, not that Interior establish with scientific certainty the exact minimum amount of water permanently needed each year for enhanced instream fishery flows that will restore Trinity River Basin to pre-TRD conditions. The TRFEFR acknowledges that the best available scientific data is not exact. This does not make Interior=s decision arbitrary and

capricious. To the contrary, the certainty Plaintiffs seek could prevent the mandated statutory goal of flow restoration from ever being implemented.

Plaintiffs next argue that although it may be possible that a flow recommendation can be implemented Awithout precisely knowing what flows will, in fact, achieve what degree of morphological change . . . . the decision to cast such numbers in stone despite the high degree of uncertainty surrounding them and the explicit need for an extensive and detailed adaptive management plan to cover a huge array of contingent unknowns is arbitrary and capricious.@ Doc. 233 at 39:12-16. Instead, plaintiffs propose that the flows proceed Aon a yearly basis to posit necessary flows, test these in accordance with the adaptive management plan and make necessary yearly adjustments.@ Doc. 286 at 13:8-10. They argue that Section (b)(23) does not require the Secretary to actually implement the permanent instream flows.

Section (b)(23) has two subsections. The first mandates that the TRFES be completed and that it make recommendations regarding permanent instream flows. The second mandates that the recommendations be forwarded to Congress no later than December 31, 1996 and that if the Secretary and the Hoopa Valley Tribe concur, that those recommendations be implemented. The term Apermanent@ in the first section combined with the mandate that the recommendations actually be implemented upon the occurrence of finite events, forecloses plaintiffs

interpretation. Plaintiffs proposal that the instream flows for the Trinity River continue to be studied on a yearly basis and be changed, annually, based upon new information in perpetuity derogates the statute=s use of the term Apermanent.@ APermanent@ is defined as Aexisting perpetually; everlasting, especially without significant change@ and Aintended to exist or function for a long, indefinite period without regard to unforeseeable conditions.@ Random House Webster=s, Unabridged Dictionary 1442 (1998). That the term Apermanent@ encompasses a variable flow regime, based on annual hydrological conditions, as pertains to Interior=s actual management of annual CVP water allocations, is not necessarily inconsistent with the definition of Apermanent.@

The law mandates that the Trinity River and fishery must now be restored with CVP water flows. Congress has required that Trinity River water be the source of the restoration. It has not provided a replacement source of that water for the CVP. That such restoration will likely create CVP water shortages that will deprive other CVP users has not been addressed by Congress, except for general reference in the CVPIA to balance needs of other CVP water users. '3402(f). Ultimately, Interior annually uses complex quantitative water management methods to accommodate the large number of variables it faces in annually allocating CVP water among environmental, municipal, industrial, agricultural, and power generating uses. The flow levels selected are not arbitrary or

capricious as a matter of law; however, they were not selected from a reasonable range of alternatives.

Plaintiff=s motion for summary judgment based on the arbitrariness, capriciousness, or unlawfulness of the recommended flows in the ROD is DENIED. The federal defendants= and the Hoopa Valley Tribe=s motions on the same issue are provisionally GRANTED, subject to an SEIS which takes a hard look at a flow restoration plan which considers non-flow and secondary statutory objectives.

E. REMEDY

Defendants argue that if NEPA violations are found, the court should exercise its judicial and equitable discretion and allow the ROD to be implemented or at least allow the non-flow measures of the ROD to continue as they have under the preliminary injunctions. Plaintiffs argue that the ROD should be set aside in accordance with Section 706 of the APA.

APA Section 706 provides: A[t]he reviewing court shall . . . hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.@ 5 U.S.C. ' 706. Despite the mandatory language, Ashall,@ courts retain equitable discretion to fashion appropriate remedies when there has been a violation of NEPA. *See Amoco Production Co. v. Village of Gambell, Alaska*, 480 U.S. 531, 541-45 (1987);

Nat=l Parks & Conservation Ass=n v. Babbitt, 241 F.3d 722, 737 (9th Cir. 2001).

To determine whether injunctive relief is appropriate, the traditional balance of harms analysis is applied. *Nat=l Parks & Conservation*, 241 F.3d at 737. The court should consider whether there will be irreparable injury and whether there are other adequate legal remedies. *Weinberger v. Romero-Barcelo*, 456 U.S. 305, 312 (1982). However, [e]nvironmental injury, by its nature, can seldom be adequately remedied by money damages and is often permanent or at least of long duration, *i.e.*, irreparable.@ *Amoco*, 480 U.S. at 545. AWhen the >proposed project may significantly degrade some human environmental factor,= injunctive relief is appropriate.@ *Nat=l Parks & Conservation*, 241 F.3d at 737 (quoting *Alaska Wilderness Recreation & Tourism Assoc. v. Morrison*, 67 F.3d 723, 732 (9th Cir. 1995).

A violation of NEPA is an environmental harm. *Sierra Club v. Marsh*, 872 F.2d 497, 500-04 (1st Cir. 1989) (ACongress, in enacting NEPA, explicitly took note of one way in which governments can harm the environment (through inadequately informed decisionmaking); . . . courts should take account of this harm and its potentially >irreparable= nature.@). A[T]he harm at stake in a NEPA violation *is* a harm to the *environment*, not merely to a legalistic >procedure,= nor, for that matter, merely to psychological well-being. . . . [T]he risk implied by a violation of NEPA is that real environmental harm will occur through

inadequate foresight and deliberation.@ *Id.* at 504 (emphasis in original).

The current dispute is unusual in that environmental concerns are on both sides of the balance of hardships. On one side, the federal defendants, in seeking to restore the Trinity River fishery, failed: 1) to adequately analyze the impact of likely major CVP reoperation associated with the X2 standard on the Sacramento River and Delta ESA-listed species; 2) to consider the impacts of Trinity Dam outlet bypass on Northern California hydroelectric power supply and reliability; 3) to adequately analyze the Preferred Alternative=s ability to impact on Northern California hydroelectric power supply; and, 4) to fully consider an Integrated Management Alternative. NEPA=s purpose is to ensure decisions made by federal agencies include such analysis to reduce the likelihood a bad decision is made. On the other hand, restoration of the Trinity River fishery, and the ESA-listed species that inhabit it, are to remedy real and continuing environmental harm, and are unlawfully long overdue. The chronic delays by Interior in discharging its express statutory duties in managing the CVP, and its riverine components, have unjustifiably thwarted these Congressional objectives. *See generally, Firebaugh Canal Co. v. United States*, 201 F.3d 568, 577-78 (9th Cir. 2000).

Contrary to Plaintiffs= assertion of irrelevancy, the government is also in breach of its general and specific

(' 3406(b)(23)) independent federal trust obligation to the Hoopa and Yurok Tribes. Congress mandated that restoration of the Trinity River begin no later than 1996, in part to discharge the federal government=s trust responsibility to the Tribes, a deadline six years past. In addition to harm caused by delay, A[T]he harm at stake is a harm to the *environment*, but the harm consists of the added *risk* to the environment that takes place when governmental decisionmakers make up their minds without having before them an analysis (with proper public comment) of the likely effects of their decision upon the environment.@ *Sierra Club*, 872 F.2d at 500 (emphasis in original). The balance of equities favors continuing to restore the Trinity River fishery.

Congress here provided a failsafe mechanism of a minimum flow regime. The undisputed evidence establishes that the 340,000 AF annual flows are not sufficient in all types of water years to restore the Trinity River fishery. To further delay implementation of (b)(23) for another indefinite period of time while Interior Atries to get it right@ is an inadequate remedy which will result in irreparable injury.

Considering the totality of all factors, the balance of hardships weighs heavily against enjoining the non-flow measures in the ROD and the implementation of the ROD=s critically dry and dry year flows, in view of expert testimony that less than 368,000 AF of annual flows actually jeopardizes the Trinity River fishery. Despite

all the Plaintiffs= legitimate concerns, Congress has mandated the Trinity River and its fishery must be restored without further delay. This overriding mandate comes from Congress and it is to Congress Plaintiffs must address their concerns about any unfairness in the reallocation of the Trinity River flows to the Trinity River Basin and away from other CVP uses. It is unacceptable that Interior=s failures be the catalyst to impose harm on all the competing interests. Such prioritization of federal water use for the Trinity River is the province of the executive and legislature, not the judiciary.

After full analysis, it is likely that the infirmities in the environmental scoping and review processes can be cured by an SEIS. The Sacramento River and Delta ESA-listed species are not harmed by immediately implementing the ROD=s non-flow measures and permitting use of critically dry and dry year flows provided by the ROD. Any harm to the NEPA decisionmaking process by allowing these measures to go forward is overwhelmingly offset by the benefit to the Trinity River fishery and need to discharge the federal trust obligation owed to the Indian Tribes.

However, the balance of the hardships does favor enjoining the implementation of the ROD=s permanent recommended flows above the 452,600 AF level, pending full compliance with NEPA and the ESA. There are ESA-listed species on both sides of the balance and other impacts on

CVP water users which have not been properly subjected to a Ahard look.@ NEPA=s purpose is to prevent the agency from making a decision that it will later regret. The bureaucratic tendency to chose an option simply because it has already been implemented is a harm to the environment that is real. Congress has set the minimum release of 340,000 AF/year of water as a fail-safe to prevent further degradation of the Trinity River pending Interior=s lawful completion of scientific study of the issues. Congress= finding deserves deference. The court has no inclination to, nor should it, substitute its judgment to decide the permanent increase in the amount of CVP water that should flow into the Trinity River. This would result in judicial micro-management of the Trinity River restoration. The restoration decision was made by Congress, to be implemented by Interior, not the Court.

Congress has expressed its unequivocal concern in the 1984 and 1996 Acts, as implemented by CVPIA ' 3406(b)(23), is about fulfilling the federal government=s trust obligation to the Indian Tribes. The federal defendants= failure to meet the deadlines set out by Congress in the CVPIA defeats this purpose. Continued delay only exacerbates the harm. In completing an SEIS the federal defendants must expedite their review and conclude the process within one hundred twenty (120) days following this decision. The federal defendants have studied the Trinity River restoration issue for over twenty years.

The process must now be immediately completed in compliance with federal law.

IV. CONCLUSION

When the EIS scoping to define the purpose for the TRFES began, the Tribes participated and their lawyer stood by while the County of Trinity persuaded the EIS management team to unfairly and unlawfully narrow the purpose and scope of the EIS. Such action seeking to limit informed decision-making for the sale of expediency, has no place in the NEPA process which invests government lawyers and representatives with the legal responsibility to carry out NEPA=s public objectives to ensure that a hard look is taken at all reasonable alternatives to proposed major federal action, which will have undeniable consequences, to enable the Agency to make an informed decision with informed public participation. Here, an intentional subversion of NEPA=s requirements prevented full and fair consideration of significant impacts which will be caused by CVP reoperations. A reasonable Integrated Management alternative, which would utilize non-flow measures and seek to minimize impacts on all other CVP interests, while achieving the statutory goal of Trinity River fishery and basin restoration, was not fairly considered. Inadequate consideration was given to power supply and reliability impacts in a changing hydropower environment. The public had no participation in any NEPA process leading to the ROD, after the DEIS

public comment period closed. BioOp RPMs for salinity control and temperature regulation that constitute major action were improperly adopted.

Abrogation of the full and free investigation and consideration of all reasonable alternatives has resulted in an administrative record that severely limits the Court=s ability to conduct a fully informed analysis of all the merits of Plaintiffs= NEPA claims. Specifically, that significant CVP re-operation adverse impacts were not considered; an Integrated Management Alternative was not properly considered or fairly analyzed; and that the Preferred Alternative ignores the best available science. Some of the NEPA procedures followed impaired, rather than advanced, public participation and informed decision-making. They also caused substantial post-ROD and extra-record information to be submitted as a direct result of the inappropriately narrow scope of the EIS. The defenders of the EIS and ROD contend plaintiffs did not timely present information, although the narrow definition of the EIS=s purpose was the ultimate excuse for Interior not performing the analysis. They now criticize the Hanson opinions as bad science, yet there was no public discussion or NEPA review of such management measures, because the flow recommendations were made without benefit of Dr. Hanson=s scientific calculations and measures to achieve secondary objectives. The agencies and EIS management team intentionally narrowed the EIS purposes to Aecological@ and Aflow-driven@ objectives which avoided

addressing, and foreclosed public participation, on any alternative that sought to utilize non-flow measures to minimize species and other CVP-wide adverse impacts without compromising the Trinity River fishery and basin restoration.

Although Interior cannot be forced to adopt an Integrated Management alternative, such a reasonable alternative was entitled to a hard look on its merits. There is no explanation for the failures of the NEPA process that occurred in this case, except that public participation had been concluded when the hard questions were raised and dismissed by Interior as insignificant. The NEPA process must be lawfully completed by a supplemental EIS.

ORDERS

The Hoopa Valley Tribe=s motion for summary judgment on the issue of NEPA=s applicability to this case as irreconcilably inconsistent with ' 3406(b)(13) and related statutes is DENIED.

Plaintiffs= motion for summary adjudication on the issue of the federal defendants= failure to comply with NEPA based on inadequate assessment of impacts of the Preferred Alternative on Sacramento River and Delta ESA-listed species which will be caused by CVP reoperation is GRANTED.

Plaintiffs= motion for summary judgment on the issue of the federal defendants= failure to comply with NEPA based on a lack of analysis of the Lewiston Dam alternate

bypass RPM is GRANTED. Opposing motions on the same issue are DENIED.

Plaintiffs= motion for summary adjudication on the issue of the federal defendants= failure to comply with NEPA in their analysis of the X2 RPM is GRANTED. The federal defendants= motion on the same issue is DENIED.

Plaintiffs= motion for summary judgment on the issue of federal defendants= failure to comply with NEPA based on analysis of the Preferred Alternative=s effect on power system reliability is GRANTED. The federal defendants= motion on the same issue is DENIED.

Plaintiffs= motion for summary judgment on the issue of federal defendants= failure to comply with NEPA based on the timing of the EIS is GRANTED IN PART.

Plaintiffs= motion for summary judgment on the issue of the federal defendants= failure to comply with NEPA based on the range of alternatives considered is GRANTED.

Plaintiffs= motion to set aside the X2 RPM in the USFWS BioOp as major action is GRANTED. The federal defendants= motion on the same issue is DENIED. Plaintiffs= motion to set aside the the NMFS BioOp RPM requiring immediate implementation of the Preferred Alternative is GRANTED. Federal defendants= motion on the same issue is DENIED. Plaintiffs= motion to set aside the NMFS BioOp because it failed to identify lethal harm to species is DENIED. Federal defendants= motion on the same issue is GRANTED.

Plaintiffs: motion to set aside the ROD because it is arbitrary and capricious is DENIED.

Having balanced the hardships, and to avoid irreparable injury, implementation of ROD flows in years except dry or critically dry years, not to exceed 452,600 AF, is ENJOINED until the federal defendants complete an SEIS in compliance with NEPA and this decision.

All non-flow measures prescribed by the ROD shall proceed and plaintiffs: request for an injunction against such ROD measures is DENIED.

The federal government has a trust obligation to the Hoopa and Yurok Indian Tribes and Congress expressed its intent this obligation be finally fulfilled more than four years ago. The federal defendants must proceed immediately to complete the NEPA process. The court retains jurisdiction over this controversy to enforce the orders prescribed. The federal defendants shall complete the SEIS on the issued designated within one hundred twenty (120) days following date of service of this decision.

SO ORDERED.

DATED: December 9, 2002.

Oliver W. Wanger
UNITED STATES DISTRICT JUDGE

APPENDIX B

Trinity County Notice of Preparation for an Environmental Impact Report

TRINITY COUNTY

Notice of Preparation

For An Environmental Impact Report

TRINITY RIVER BRIDGES REPLACEMENT PROJECT

DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL ASSESSMENT

TRINITY RIVER BRIDGES REPLACEMENT PROJECT-SALT FLAT, BUCKTAIL, POKER BAR, AND TREADWELL BRIDGES

TO: Affected Agencies, Public Interest Groups And Interested Parties Via Certified Mail

FROM: Trinity County

SUBJECT: Notice of Preparation for a Draft Environmental Impact Report and Environmental Assessment for the Trinity River Bridges Replacement Project

LEAD AGENCY: Trinity County Planning Department

APPLICANT: U.S. Bureau of Reclamation
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, CA 96019-8400

The Trinity River Bridge Replacement Project will be considered for funding with both federal and state funding, and will therefore require review under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Due to the extensive and potentially controversial nature of the project, an Environmental Impact Report/Environmental Assessment (EIR/EA) will be prepared.

Notice is hereby given that Trinity County will be the CEQA Lead Agency and will prepare an Environmental Impact Report (EIR) for the Trinity River Bridges Replacement Project as described below. The County requests your views concerning the scope and content of the environmental information germane to your interests or agency's statutory responsibilities in connection with the proposed project. The Bureau of Reclamation will be the NEPA lead agency, with the Bureau of Land Management acting as a cooperating agency under NEPA.

A project description, location maps, and a summary of the potential environmental effects are contained in the attached materials.

Due to time limits mandated by State law, your response must be sent at the earliest possible date, but *no later than 30 days* after receipt of this notice. Please send your response to

Tom Stokely, Senior Planner
Trinity County Planning Department
Natural Resources Division
P.O. Box 156

Hayfork, CA 96041
(530) 628-5949

Additional documents and files relating to the proposed project are available for review at Trinity County Planning Department, Natural Resources Division, 98A Clinic Ave., Hayfork, CA, or by telephoning or writing to Tom Stokely at the address and number shown above.

PROJECT TITLE: Trinity River Bridges Replacement Project

PROJECT APPLICANT: U.S. Bureau of Reclamation
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, CA 96019-8400

PROJECT LOCATION: Trinity County, CA. The four bridge sites are located on the Trinity River below Lewiston Dam at Salt Flat, Bucktail, Poker Bar, and the Treadwell Property. Please see the attached location map.

PROJECT DESCRIPTION: In joint action with the U.S. Bureau of Reclamation and the U.S. Bureau of Land Management, Trinity County is working to replace and/or modify the Bucktail, Salt Flat, Poker Bar, and Treadwell Bridges on the Trinity River below Lewiston Dam. All of the bridges, with the exception of the Bucktail Bridge, are private bridges. The Bucktail Bridge is a Trinity County bridge. Material for fill may be obtained from the Rush Creek delta in the Mainstem Trinity River. The proposed project is one part of a cumulative effort towards the restoration of the Trinity River as described in the Secretary of the Interior's December 19, 2000 Trinity River Record of Decision (ROD). The replacement of the existing bridges would increase channel capacity downstream of the dam, improving flexibility for future operational changes to the Trinity River Division of the Central Valley Project (CVP) associated with potential increased fishery flows. The project, if implemented, would also improve public health and safety at each bridge site, and improve dam safety for Trinity and Lewiston Dams. As constructed, the four bridges cannot accommodate the 100-year storm event or flow releases from Lewiston dam greater than 6,000 cfs (combined with tributary inflows). The proposed project would reduce the existing high likelihood of flooding of the 4 bridges and/or their access roads and the potential loss of property and lives.

This project stems from the need to provide safe and reasonable year-round access to the parcels served by these bridges, and is identified in the Interior Secretary's December 19, 2000 Record of Decision (ROD) as a necessary step towards the restoration of the Trinity River's fisheries. In addition, the modification and/or replacement of the subject bridges could potentially enhance CVP water supplies, improve public health and safety, reduce the existing high likelihood of flood damage, improve general management flexibility of the CVP, and better comply with local, state, and federal standards for structures in a designated floodplain.

POTENTIAL ENVIRONMENTAL EFFECTS: The EIR is being prepared to evaluate potentially significant impacts outlined below. Also refer to the attached Initial Study Environmental Checklist form for additional information regarding project issues, technical studies required, and agency consultations and permits.

Air Quality. The EIR will address regional air quality conditions in Trinity County and the air quality impacts resulting from the construction phase of this project. Air quality will be examined to determine if the proposed project would result in a conflict with the North Coast Unified Air Quality Management District regional air quality plan. The nearby Weaverville Basin is in

moderate "non-attainment" of state PM10 standards. Vehicle exhaust and fugitive dust from construction activities and use of the bridges and adjacent roads will be considered.

Noise. Potential noise impacts associated with construction will be assessed, including impacts to existing and future development. Noise levels will be evaluated for consistency with the Douglas City and Lewiston Community Plans, the Trinity County General Plan, and State and federal standards and guidelines regulating noise on public and private lands.

Geology and Soils. Geological and seismic safety, and soils stability will be addressed in the EIR.

Hydrology, Water Quality, and Floodplains. The EIR will address any hydrology, water quality, and floodplain impacts that may occur as a result of the proposed project.

The construction phase of the project may have the potential to increase erosion, turbidity and sedimentation levels downstream of the project sites. Construction activities within the active channel of the Trinity River would be subject to water quality limitations imposed by the California Regional Water Quality Control Board specific to turbidity and construction materials.

If it is determined that project activities would result in a change to the 100-year floodplain, a floodplain risk assessment will be performed to determine what impacts, if any, would occur to adjacent structures and the public. However, it is anticipated that completion of the proposed project will reduce flooding risks and will not adversely affect the 100-year floodplain and Base Flood Elevations in the project areas.

Biological Resources. Existing biological conditions within the Trinity River and the area surrounding the project sites will be described, and potential impacts of the proposed project on vegetation and wildlife will be assessed. The EIR will evaluate the likelihood for any significant biological impacts, including effects on special status plant and animal species, and wetland/special aquatic resources.

The project environmental study limits for the proposed Trinity River Bridges Replacement Project has the potential to support a variety of special-status species (listed and non-listed). Spring and fall chinook salmon, coho salmon, Pacific Lamprey and summer and winter steelhead are known to spawn within the Trinity River, and suitable spawning habitat is available for the species within the study limits of the project. In addition, the Trinity River is also designated as critical habitat for coho salmon by the National Marine Fisheries Service (NMFS). Other special-status and listed species within the project area could potentially include the willow flycatcher, green sturgeon, silky cryptantha, valley elderberry longhorn beetle, northwestern pond turtle, yellow warbler, yellow-breasted chat, bald eagle, and osprey. A comprehensive plant and wildlife survey will be conducted to determine species presence/absence and potential project-related effects to species that are determined to be present. Additionally, a Biological Assessment will be prepared (pursuant to Section 7 of the Federal Endangered Species Act [ESA]) to address impacts to listed salmonid species. A Biological Option (Federal ESA) and Incidental Take Permit (State ESA) will be prepared.

The project environmental study limits support riparian habitat, considered to be a sensitive natural community. Construction activities associated with the proposed Trinity River Bridge Replacement Project would result in the loss of an undetermined acreage of riparian habitat.

Construction activities associated with the proposed project would result in temporary and permanent impacts to wetland features at the Bucktail Bridge site and potentially other sites that may be subject to U.S. Army Corps of Engineer's (ACOE) jurisdiction, pursuant to Section 404 of the Clean Water Act. A delineation of jurisdictional wetlands will be conducted within the project environmental study limits and a delineation report will subsequently submitted to the ACOE for review and verification, as necessary.

Energy. The EIR will contain an evaluation, in general terms, of the construction and operational requirements of the new bridges and the conservation potential of each alternative.

Cultural Resources. An archaeological study will be conducted within the environmental study limits of the project to determine if any significant archaeological resources are present. The project site does not contain any known cultural resources; however, there may be cultural resources that are currently hidden within the project study limits that could be unearthed and discovered during the construction phase of the project.

The Nor-Rel-Muk Nation, a local unrecognized Indian Tribe, has requested that the project consider acquisition and development of a parking area and access to sacred tribal lands located upstream of the Salt Flat Subdivision, which are located on BLM lands. Issues related to the Nation's access to those lands will be considered in the EIR/EA

Hazards. The replacement and/or modification of the four bridges is not expected to involve the use of hazardous materials and, therefore, will not expose the public to significant hazard. Hazards related to use of the existing bridges during floods are anticipated to be significantly reduced upon project completion.

Land Use. The proposed project is consistent with Trinity County's General Plan and related policies. The parcels served by the bridges will maintain access throughout construction and will be better served through the reduced risk of flooding at the bridges and/or their approaches upon project completion. Growth-inducing impacts are not expected to occur as a result of the project, but will be examined.

Socioeconomic/Displacements/Environmental Justice. Environmental justice, right-of-way acquisition, residential/business displacements, relocation assistance, business impacts, and neighborhood cohesion will be analyzed.

Public Services/Utilities. An analysis of public services and utilities coordination will be included. This will include the possibility of the Salt Flat, Poker Bar and Treadwell bridges being incorporated into the Trinity County road system.

Visual Resources. A Visual Impact Analysis will be included describing the existing visual characteristics of the project area and analyzing any potential visual impacts.

Transportation and Circulation. Transportation and circulation impacts will be analyzed for each of the bridge construction alternatives. A main objective of the project is to provide safe and reasonable year-round access to those parcels served by the bridges.

Construction Impacts. The EIR will identify and analyze any further short-term construction impacts associated with air quality, noise, water quality, traffic congestion and detours, safety, visual, business access, community facilities, etc.

SCOPING PERIOD: The purpose of this scoping period is to provide involved agencies and the public an opportunity to learn about the project and to solicit comments to assist the Lead Agencies in identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in the EIR/EA. A public review period for the Notice of Preparation has been established from March 31, 2002 through April 30, 2002. Comments should be made in writing and submitted to Tom Stokely at the above address.

Public and agency comments must be received no later than 5:00 p.m. on April 30, 2002. Additionally, a public scoping meeting has been scheduled for April 25, 2002 at 6:30 pm at the Trinity County Free Library, 101 S. Main St., Weaverville, CA.

APPENDIX C

Scoping Report

TRINITY RIVER BRIDGES PROJECT

Scoping Report

July 31, 2002

Prepared for
U.S. Department of the Interior
Bureau of Reclamation, Mid-Pacific Region
Northern California Area Office
Shasta Lake, CA 96019
Attn: James DeStaso

TRINITY RIVER BRIDGES PROJECT

Scoping Report

July 30, 2002

Prepared for:

Bureau of Reclamation
Northern California Area Office
Shasta Lake, CA 96019
Attn: James DeStaso

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TRINITY RIVER BRIDGES PROJECT
SCOPING REPORT

1. INTRODUCTION

This document describes the scoping process that will assist the Bureau of Reclamation, Bureau of Land Management and Trinity County, in their role as Lead Agencies in determining the proper scope of the EA/EIR.

In order to effectively frame the depth and breadth of the analysis in the EA/EIR, the scope of the document must be determined, including the topics and level of detail. This is an essential component of the NEPA/CEQA process. The scoping process is open to the public, state and local governments (including tribal governments), and affected federal agencies. The objectives of scoping are to:

- identify the affected public and agency concerns
- facilitate an efficient EA/EIR preparation process
- define the issues and alternatives that will be examined in detail in the document while simultaneously devoting less attention and time to issues that cause no concern
- save time in the overall process by helping to ensure that the draft document adequately addresses relevant issues
- produce a comprehensive document that thoroughly analyzes all pertinent issues areas

The public participation process, which is a key part of scoping, offers a forum to bring together and identify the concerns of affected federal, state and local agencies, the project proponents and interested stakeholders in an open and objective environment.

2. INITIAL SCOPE OF THE ANALYSIS

In its Notice of Preparation (NOP) published April 16, 2002, Trinity County identified the study area as the general area surrounding the Trinity River, between the communities of Lewiston and Douglas City in Trinity County, California. The NOP stated the EIR would consider modification or replacement of four bridges to provide safe and reasonable access to the parcels served by the existing bridges. It also identified potentially significant impacts that may be associated with this project.

3. SUMMARY OF MEETINGS AND OPPORTUNITIES FOR PUBLIC INVOLVEMENT

The following is a summary of the public involvement and scoping process that has been completed to date:

October 5, 2002 — A Project Kick-Off meeting was held with representatives from the Bureau of Reclamation (BOR), Trinity County (County) and the environmental consulting team, to discuss the project, potential alternatives, the timing requirements for the environmental review process, scope of technical studies, and potential permitting requirements.

November 2001 — A series of conference calls and meetings between BOR staff, County staff and the environmental consulting team that resulted in modifying the scope of the project from an Environmental Assessment / Initial Studies to a Environmental Assessment /Environmental Impact Report due to expected level of public controversy.

January 2001 — All property owners located within and adjacent to the proposed project were contacted via mail requesting access for surveys, studies and investigations. This correspondence also offered the opportunity to discuss the project with the Lead Agencies. As the project has developed, and the environmental study limits are refined, additional contacts have been made with affected property owners.

January 25, 2001 — A meeting that included BOR staff, County staff, Bureau of Land Management (BLM) staff and the environmental consulting team to discuss the addition of BLM as a federal lead agency for the EA/EIR on the project. The inclusion of public lands under BLM jurisdiction, and their management requirements under the Wild & Scenic Rivers Act resulted in a Memorandum of Understanding between the Lead Agencies.

April 16, 2002 — Trinity County, the lead CEQA agency circulated a Notice of Preparation with the State of California, Governors Office of Planning and Research, State Clearinghouse for the Trinity River Bridges Project (SCH #2002042074). The NOP encouraged full public participation to promote open communication on the issues surrounding the proposed project. All federal, state, and local agencies and other persons or organizations were urged to participate in the scoping process. Mr. Tom Stokely, Senior Planner for Trinity County Planning Department, P.O. Box 156, Hayfork, CA 96041, (530)-628-5949 was listed as the point of contact for further information. The NOP is presented in **Appendix A.**

In conjunction with the issuance of the NOP, a Public Notice was published on April 24, 2002 in the Trinity Journal, the newspaper that serves Trinity County. The notice included information on the proposed project, as well as the date and location of the public scoping meeting.

May 2, 2002 A Public Agency Scoping Meeting was held at the Trinity County Public Library in Weaverville, CA. The purpose of the meeting was to outline the Trinity River Restoration Program, identify the types of actions and alternatives that may be evaluated in the Joint NEPA/CEQA document, describe the nature, scope and timing of the environmental process, and to solicit comments on the NOP.

May and June, 2002 Several meetings with individuals and residential groups occurred subsequent to the Public Meeting in Weaverville. These meetings were informational in nature, and provided additional opportunities for informal dialogue between the Lead Agency representatives and interested stakeholders.

4. SCOPING COMMENTS

The scoping process resulted in the presentation and/or submission of comments from approximately 35 individuals and organizations. The comments were submitted to the Trinity County Planning Department via written correspondence, e-mail, and oral comments presented at the scoping meeting. The following section discusses the process of reviewing, organizing, and incorporating the comments into the NEPA/CEQA process.

REVIEW AND ORGANIZATION OF SCOPING COMMENTS

Scoping comments were reviewed by representatives of the Lead Agencies, and organized to identify Lead Agencies, Responsible Agencies and stakeholders. Copies of the comment documents are on file with the Trinity County Planning Department. Each comment was carefully reviewed, and the issues, questions and concerns were highlighted. These comments addressed a variety of topics that pertain to the proposed project outlined in the NOP. **Table 1** provides a synopsis of comments provided by a variety of stakeholders. These comments are organized by subject area, using the outline prepared for the Trinity River Bridges Project Draft EA/EIR. A scoping comment may be addressed in more than one section of the Draft EA/EIR, if such consideration is required to appropriately consider the nature of the comment. Comments that did not clearly fall within one of these areas were grouped together under General Comments. Comments that were determined to be substantive in nature are summarized in the following section.

5. COMMENT SUMMARY

The following section provides a summary of substantive comments that may assist the Lead Agencies in identifying the range of actions, alternatives, mitigation measures and significant effects to be analyzed in depth in the EA/EIR. All comments submitted were circulated and reviewed by the Lead Agencies during the scoping process.

BUREAU OF LAND MANAGEMENT, REDDING FIELD OFFICE - MAY 8, 2002

- Evaluate alternative bridge locations in a manner that addresses access and ownership (public and private) issues as they relate to public lands managed by BLM.

- Assess impacts and identify opportunities with respect to cultural resources, traditional Native American uses, and recreational resources. Coordinate with BLM to ensure that design criteria are consistent with management direction.

- Identify opportunities that will meet BLM objectives for public access to the Salt Flat area..

- Identify the circumstances that would result in a road and bridge that would be under County jurisdiction.

- Consider the indirect impacts associated with growth and development in the vicinity of Salt Flat.

REGIONAL WATER QUALITY CONTROL BOARD, NORTH COST REGION - MAY 31, 2002

- A National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges may be needed. If the project has not been completed by January 1, 2003, the area of impact threshold requiring an NPDES permit will be reduced from five acres to one acre.

- Water Quality Certification under Section 401 of the Clean Water Act will be required in conjunction with U.S. Army Corps of Engineers or other Federal permits.

CALIFORNIA DEPARTMENT OF FISH AND GAME - MAY 22, 2002

- The Department will be acting as a "Responsible Agency" under CEQA and be required to make certain findings concerning the potential to cause significant adverse environmental effects.

- Request evaluation of likelihood of significant biological impacts to special-status species and the habitat upon which they depend.

- Include specific mitigation measures to reduce the impacts to these species and habitat.

- Provided general mitigation themes, and offered to work with the Lead Agencies to develop needed mitigation measures.

- In the event that project activities result in "take" of a State threatened or endangered species, the project will be subject to the provisions under Section 2081 (b) of the California Fish and Game Code.

- For those species that are both Federal and State listed, the proponent may request a consistency determination from the department under Section 2080 of the California Fish and Game Code.

- If Section 2080 is applied, measures to minimize and fully mitigate the impacts from take should be identified and incorporated into the project.

- Activities that result in the modification of the streambed or bank, use materials from the streambed or divert or obstruct flow are subject to Section 1600 of the California Fish and Game Code.

NOR-REL-MUK NATION - MAY 16, 2002

- Tribal Chairman identified that the BLM parcel adjacent to the Salt Flat subdivision is a significant traditional use area that is managed under a Memorandum of Agreement with BLM.

- Request public access to the traditional use area if bridge is constructed with public funds.
- Request Right-of-Way to BLM parcel via public access
- Strongly object to Trinity County and the federal agencies investing public monies in a private bridge.

SIERRA PACIFIC INDUSTRIES - APRIL 15, 2002

- Request that bridge capacity and design of the Salt Flat, Bucktail and Poker Bar bridges consider the requirements of loaded log trucks and movement of heavy equipment. Design width for heavy equipment is 12'7", and a potential total weight of 120,000 lbs for some vehicles.

SACRAMENTO MUNICIPAL UTILITY DISTRICT - MAY 22, 2002

- Sacramento Municipal Utility District (SMUD) request that the agencies use State-of-the-Art Modeling in impact analysis for aquatic habitat. This analysis should include construction impacts, as well as long-term geomorphic and biological impacts associated with project features.
- SMUD is willing to provide its hydraulic model to a collaborative process and participate in peer review of bridge design alternatives to mitigate the impacts of the project.
- Suggest that the project is premature and will create significant adverse impacts without corresponding benefits.
- Questions the appropriateness of federal participation in this process prior to issuance of a new ROD for a Supplemental Environmental Impact Statement.
- Request that Trinity County and the federal lead agencies delay evaluation of the project until the fate of the ROD is more certain or a new ROD is completed.
- Suggest that the lead agencies will be unable to properly evaluate the effects and identify significant adverse impacts without additional knowledge of future flow regimes.

SALT FLAT SUBDIVISION PROPERTY OWNERS - MAY 9, 2002

- Requested that they be added to mailing list and informed as the project develops.
- Alternatives that locate the bridge on public land compromises private ownership of the bridge.
- A public land location will allow public access to bridge and adjacent areas on either side.
- A bridge that provides public access may result in sanitation, pollution and land use conflicts.
- A public land location may require a Special Use Permit from BLM to access private land.
- Specifically request that the new bridge remain on private land, spanning private property, and under private ownership.
- Identified several alternative routes to provide temporary access for residents and landowners, including overland and temporary bridge.

- Temporary access considerations should include: all-weather use, access for emergency and service vehicles, access by passenger vehicles, and provisions to restrict access for authorized users.

- Requested clarification on additional requirements for the private roads in the development (mandatory road widths, turnouts, drainage, surfacing) in conjunction with the project.

JAMES LEE BONK - APRIL 28, MAY 17, 2002

- Identified infrastructure (seep well, utility lines, and BLM survey monument) that are within the Environmental Study Limits (ESL). The actual well and a portion of water supply system are located on public land under Special Use Permit CA 24538.

- Objects to alternative that will impact the existing infrastructure by moving the bridge and/or road upstream from its current location.

- Request that alternative locations avoid removing or otherwise impacting mature vegetation on or adjacent to his property.

- The elevation requirements of the project may require an increase in the grade of the approaches and Salt Flat road. This increase may have an impact on aesthetics and the visual quality of the existing floodplain.

- Identified potential issues associated with public access to the river. Sanitation and land-use (parking, trespassing) were specifically identified as concerns.

- Requested that information on staging requirements, in terms of size and location be identified. There was a specific request that any staging areas be sited to avoid the domestic water supply system.

- Requested that alternative bridge locations utilize the existing right-of-way, or a downstream location.

- Identified a potential overland route between Salt Flat and the Bucktail area as an alternative to the Salt Flat Bridge.

SETH TODD HUNTINGTON - MAY 28, 2002

- Identified concerns about noise, air quality, sanitation, traffic and aesthetics that may be associated with the construction and long-term use of the bridge and approach road.

- Requested information regarding timing, location and aerial extent of the project, as well as the level of mitigation and monitoring that will be required.

- Requested that the visual effects of the project are minimized.

- Objects to alternative that will move the bridge and/or road from its current location.

- Identified a potential overland route between Salt Flat and the Bucktail area as an alternative to the Salt Flat Bridge for temporary access.

- Requested that the bridge should be designed to provide one-lane traffic to minimize future growth in the area.
- Objected to utilizing public funds to enhance private property.
- Identified a concern that the project may have negative effects on aquatic habitat, particularly in the side channel restoration site upstream.

NANCY TENNYSON/PAT O'CONNELL - MAY 2,2002

- Requested information on the disposition of the existing bridges if replaced with new ones.

ROBERT AND DONNA CRABBE - MAY 2, 2002

- Retain the bridge on private property and under private ownership.
- Avoid public access through Salt Flat to public lands managed by BLM with this project.
- Replace the Salt Flat bridge in its current location or immediately downstream.

GLENN AND HELEN ROCK - MAY 2, 2002

- Locate the new Salt Flat bridge at the current location and under private ownership.
- Provide a bridge or other temporary access for residents of Salt Flat during the construction period.

JOHN R. WARD - MAY 2, 2002

- Locate the new Salt Flat bridge at the current location and under private ownership.
- Provide a bridge or other temporary access for residents of Salt Flat during the construction period.
- Avoid locating the project on public lands that may require authorization from BLM.

RENNY AND GINGER NOLL - MAY 11, 2002

- Air quality (dust from Salt Flat road) is a concern, and should be examined.
- Opposed to further expansion of the bridge at Salt Flat unless the existing road (under easement) is paved.
- Requested a study that addresses the impacts of the project relative to air quality concerns of property owners in the immediate area.

AVERIL CARMONA - MAY 2, 2002

- Are the funds available to complete the environmental studies?
- Will other roads and features affected by high flows be addressed in the EA/EIR relative to safety and access? Roads in the Poker Bar community were cited as an example.

MR. TREADWELL - MAY 2, 2002

- Requested information regarding design criteria, including width and weight factors.
- Inquired about the relative cost identified in the public meeting. Did these costs reflect minimum public road requirements?
- How will the public versus private ownership question be addressed?

RAYMOND PATTON - MAY 2, 2002

- What are the liabilities surrounding the use of public funds for private structures? Will the EA/EIR address off-site access alternatives?

SID MICKELSON - MAY 2, 2002

- Stated that there should be equitable consideration of impacts to private property associated with high flows.
- Asked if public funds were available to assist landowners affected by high flows.

6. CONCLUSIONS

The scoping comments and concerns described herein identify the significant issues, potential alternatives and public concerns that will be addressed in the Draft EA/EIR. While the Draft EA/EIR will focus on these significant issues, all issues identified through scoping will be addressed in the Draft EA/EIR. A completion date for the draft EA/EIR has not been determined yet. However, when completed, the Draft EA/EIR will be distributed for public comments and interagency review. The responses to comments on the Draft EA/EIR will be included in the Final EA/EIR.

STRUCTURE OF THE ENVIRONMENTAL ANALYSIS

All of the comments received will be considered in the Draft EA/EIR and will be covered under the analysis of resource areas. Resource areas to be evaluated in the EA/EIR are described below. Some comments, such as those that discuss compliance and enforcement, easements, regulations, and protection of resources, will be addressed under multiple resource areas

Geology, Fluvial Geomorphology and Soils

This resource area considers the environmental aspects of stratigraphy, topography, soils and sediments, engineering properties of the materials, seismic hazards, slope stability, earthworks, mineral resources, unique landforms, and geological conditions that may limit development or that influence contaminant distribution and migration or influence ground water resources. This resource area would include an analysis of areas that are subject to Trinity County's Granitic Terrain Ordinance.

Water Resources

This resource area considers the hydrologic and hydraulic aspects of the Trinity River. This resource area would include analysis of surface water, hydrogeology, ground water, and flood plains.

Water Quality

This resource area considers the elements of water quality in conjunction with Clean Water Act and other regulatory requirements. This resource area would include analysis of water quality parameters as they relate to the project.

Fishery Resources

This resource area addresses native and non-native fish species that occupy or utilize the Trinity River for some or all portions of their life history. The analysis will consider the direct and indirect impacts on these species and their habitat.

Tribal Trust

This resource area considers the projects impacts as they relate to federal government's trust responsibility to protect the fishery resources of the region's Indian tribes. Project impacts to trust resources (fisheries) could consequently affect the socio-cultures and economies of the tribes.

Vegetation, Wildlife and Wetlands

This resource area addresses the vegetation communities, wildlife species and habitat, and wetland and riparian areas in and adjacent to the project area. The analysis will consider the direct and indirect impacts on these resources.

Recreation and Recreational Facilities

Recreational aspects associated with the Wild & Scenic River designation will be included in the analysis.

Land Use and Land Cover

Land use refers to human use of the land for economic production (residential, commercial, industrial, recreational or other purposes) and for natural resource protection. While a particular parcel of land may support many uses simultaneously, some uses are mutually exclusive. Similarly, while the quantity of land is fixed, there are infinite combinations of land uses. Land use describes what is practiced, permitted, or planned. Land cover, an increasingly important attribute of land use, describes what is physically on the ground. Consistency with the planning direction provided by the BLM Resource Management Plan, Trinity County General Plan and Community Plans for Lewiston and Douglas City will be addressed. This section will also include an analysis of growth –inducing impacts as it relates to land use.

Socioeconomic Conditions

Socioeconomics comprises the social, economic, and demographic characteristics of a region. The socioeconomic analysis will consider changes in employment, income, business volume, and population characteristics, which in turn can affect resources such as housing, public services, and infrastructure.

Cultural Resources

The EA/EIR must identify those properties within the project area that are currently listed or are eligible for the National Register of Historic Places (NRHP). Native American traditional cultural properties will be discussed in this section.

Air Quality

This resource area analyzes the potential impact of implementing the project on air quality, primarily short-term construction impacts.

Environmental Justice

Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group of people should bear a disproportionate share of negative impacts from an environmental action the potential impact of implementing the project on air quality.

Aesthetics and Visual Resource

Visual and Aesthetic Resources are those natural resources, landforms, vegetation and man-made structures in the environment that generate one or more sensory reactions and evaluations by the observer, particularly in regard to pleasurable response. This resource area will include an analysis of the project relative to the outstanding and remarkable values identified for the Trinity River, a state and federally listed Wild & Scenic River managed by the BLM.

Hazardous and Toxic Substances and Pollution

This resource area will analyze hazardous materials management, hazardous waste management and pollutants that may be associated with the project.

Population and Housing

This resource is associated with the potential for growth inducing impacts that may occur because of the project.

Noise

Noise is unwanted sound heard by people or wildlife in proximity to manmade activities. In terms of the EA/EIR, analysis of noise impacts would generally be associated with short-term construction related impacts.

Public Services and Utilities

Utilities analysis will include potable water treatment and distribution septic systems and on-site wastewater treatment systems, storm water collection and discharge, electricity, solid waste, and telecommunications systems.

Traffic and Transportation Systems

Transportation analysis will characterize the existing transportation system, including the bridges, road networks, traffic, and parking facilities associated with the project. The quality and capacity of these facilities will be addressed in the Draft EA/EIR.

Cumulative Impacts

Cumulative impacts on the environment result from the incremental impact of the proposed action when added to other past present and reasonably foreseeable future actions. These impacts can result from individually minor, but collectively significant actions being undertaken within the project region.

Growth-Inducing Impacts

A project could have growth-inducing impacts in several ways, including the removal of obstacles to population growth, or actions that encourage and facilitate other activities beyond those proposed by the project. Increased access, or availability of public services are representative of actions that could be growth-inducing impacts.

ALTERNATIVES

One objective of the scoping process is to identify potential alternatives to the proposed action, as well as describe criteria that may be used in a preliminary screening evaluation process. The potential alternatives and alternative components will be developed through the scoping process. The lead agencies will carefully review this information and adopt a reasonable range of alternatives for inclusion in the Draft EA/EIR. The range of alternatives will include the No-Action Alternative as required by CEQA and NEPA. This alternative will serve as the baseline for assessing other alternatives to the proposed action.

Based on the information provided in the previous sections, the following criteria may be applicable in the preliminary screening of alternatives to the proposed action.

- Construction Cost
- Ownership/Jurisdiction
- Location (private/public)
- Design Components (width, capacity, foundation, approach)
- Biological Impacts (T&E Species, Wetlands)

TABLE 1
SCOPING SYNOPSIS

Comments Submitted	General Comments	Geology, Fluvial Geomorphology, and Soils	Water Resources	Water Quality	Fishery Resources	Tribal Trust	Vegetation, Wildlife, and Wetlands	Recreation	Land Use	Socioeconomics	Cultural Resources	Air Quality	Environmental Justice	Aesthetics	Hazards and Hazardous Materials	Population and Housing	Noise	Public Services and Utilities	Transportation / Traffic	Cumulative Impacts	Growth-Inducing Impacts
Bureau of Land Management Redding Field Office *5/8/02*	X					X		X	X					X		X			X	X	X
California Regional Water Quality Control Board, North Coast Region *5/31/02*	X	X	X	X	X		X								X			X	X		
California Department of Fish and Game *5/22/02*	X	X	X	X	X		X														
Trinity County Public Works Department *5/22/02*																		X	X		
NOR-REL-MUK NATION *10/28/00, 5/16/02*	X					X			X		X								X		
Sierra Pacific Industries *4/15/02*									X	X									X		
Sacramento Municipal Utility District *5/22/02*	X	X	X	X	X					X										X	
Salt Flat Subdivision Property Owners (20 Letters) *5/9/02*	X	X							X	X					X		X	X	X		
James Lee Bonk *4/28/02, 5/17/02*	X		X				X		X					X				X	X		
Seth Todd Huntington *5/28/02*	X				X				X			X		X		X	X		X		
Nancy Tennyson/Pat O'Connell *5/2/02*	X																				
Renny and Ginger Noll *5/11/02*	X								X			X							X	X	X
Averil Carmona *5/2/02*	X																			X	
Mr. Treadwell *5/2/02*	X									X									X		
Sid Mikelson *5/2/02*	X									X									X		

APPENDIX A

Notice of Preparation

TRINITY COUNTY

Notice of Preparation

For An Environmental Impact Report

TRINITY RIVER BRIDGES REPLACEMENT PROJECT

DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL ASSESSMENT

TRINITY RIVER BRIDGES REPLACEMENT PROJECT-SALT FLAT, BUCKTAIL, POKER BAR, AND TREADWELL BRIDGES

TO: Affected Agencies, Public Interest Groups And Interested Parties Via Certified Mail

FROM: Trinity County

SUBJECT: Notice of Preparation for a Draft Environmental Impact Report and Environmental Assessment for the Trinity River Bridges Replacement Project

LEAD AGENCY: Trinity County Planning Department

APPLICANT: U.S. Bureau of Reclamation
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, CA 96019-8400

The Trinity River Bridge Replacement Project will be considered for funding with both federal and state funding, and will therefore require review under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Due to the extensive and potentially controversial nature of the project, an Environmental Impact Report/Environmental Assessment (EIR/EA) will be prepared.

Notice is hereby given that Trinity County will be the CEQA Lead Agency and will prepare an Environmental Impact Report (EIR) for the Trinity River Bridges Replacement Project as described below. The County requests your views concerning the scope and content of the environmental information germane to your interests or agency's statutory responsibilities in connection with the proposed project. The Bureau of Reclamation will be the NEPA lead agency, with the Bureau of Land Management acting as a cooperating agency under NEPA.

A project description, location maps, and a summary of the potential environmental effects are contained in the attached materials.

Due to time limits mandated by State law, your response must be sent at the earliest possible date, but *no later than 30 days* after receipt of this notice. Please send your response to

Tom Stokely, Senior Planner
Trinity County Planning Department
Natural Resources Division
P.O. Box 156
Hayfork, CA 96041
(530) 628-5949

Additional documents and files relating to the proposed project are available for review at Trinity County Planning Department, Natural Resources Division, 98A Clinic Ave., Hayfork, CA, or by telephoning or writing to Tom Stokely at the address and number shown above.

PROJECT TITLE: Trinity River Bridges Replacement Project

PROJECT APPLICANT: U.S. Bureau of Reclamation
Northern California Area Office
16349 Shasta Dam Boulevard
Shasta Lake, CA 96019-8400

PROJECT LOCATION: Trinity County, CA. The four bridge sites are located on the Trinity River below Lewiston Dam at Salt Flat, Bucktail, Poker Bar, and the Treadwell Property. Please see the attached location map.

PROJECT DESCRIPTION: In joint action with the U.S. Bureau of Reclamation and the U.S. Bureau of Land Management, Trinity County is working to replace and/or modify the Bucktail, Salt Flat, Poker Bar, and Treadwell Bridges on the Trinity River below Lewiston Dam. All of the bridges, with the exception of the Bucktail Bridge, are private bridges. The Bucktail Bridge is a Trinity County bridge. Material for fill may be obtained from the Rush Creek delta in the Mainstem Trinity River. The proposed project is one part of a cumulative effort towards the restoration of the Trinity River as described in the Secretary of the Interior's December 19, 2000 Trinity River Record of Decision (ROD). The replacement of the existing bridges would increase channel capacity downstream of the dam, improving flexibility for future operational changes to the Trinity River Division of the Central Valley Project (CVP) associated with potential increased fishery flows. The project, if implemented, would also improve public health and safety at each bridge site, and improve dam safety for Trinity and Lewiston Dams. As constructed, the four bridges cannot accommodate the 100-year storm event or flow releases from Lewiston dam greater than 6,000 cfs (combined with tributary inflows). The proposed project would reduce the existing high likelihood of flooding of the 4 bridges and/or their access roads and the potential loss of property and lives.

This project stems from the need to provide safe and reasonable year-round access to the parcels served by these bridges, and is identified in the Interior Secretary's December 19, 2000 Record of Decision (ROD) as a necessary step towards the restoration of the Trinity River's fisheries. In addition, the modification and/or replacement of the subject bridges could potentially enhance CVP water supplies, improve public health and safety, reduce the existing high likelihood of flood damage, improve general management flexibility of the CVP, and better comply with local, state, and federal standards for structures in a designated floodplain.

POTENTIAL ENVIRONMENTAL EFFECTS: The EIR is being prepared to evaluate potentially significant impacts outlined below. Also refer to the attached Initial Study Environmental Checklist form for additional information regarding project issues, technical studies required, and agency consultations and permits.

Air Quality. The EIR will address regional air quality conditions in Trinity County and the air quality impacts resulting from the construction phase of this project. Air quality will be examined to determine if the proposed project would result in a conflict with the North Coast Unified Air Quality Management District regional air quality plan. The nearby Weaverville Basin is in moderate "non-attainment" of state PM10 standards. Vehicle exhaust and fugitive dust from construction activities and use of the bridges and adjacent roads will be considered.

Noise. Potential noise impacts associated with construction will be assessed, including impacts to existing and future development. Noise levels will be evaluated for consistency with the Douglas City and Lewiston Community Plans, the Trinity County General Plan, and State and federal standards and guidelines regulating noise on public and private lands.

Geology and Soils. Geological and seismic safety, and soils stability will be addressed in the EIR.

Hydrology, Water Quality, and Floodplains. The EIR will address any hydrology, water quality, and floodplain impacts that may occur as a result of the proposed project.

The construction phase of the project may have the potential to increase erosion, turbidity and sedimentation levels downstream of the project sites. Construction activities within the active channel of the Trinity River would be subject to water quality limitations imposed by the California Regional Water Quality Control Board specific to turbidity and construction materials.

If it is determined that project activities would result in a change to the 100-year floodplain, a floodplain risk assessment will be performed to determine what impacts, if any, would occur to adjacent structures and the public. However, it is anticipated that completion of the proposed project will reduce flooding risks and will not adversely affect the 100-year floodplain and Base Flood Elevations in the project areas.

Biological Resources. Existing biological conditions within the Trinity River and the area surrounding the project sites will be described, and potential impacts of the proposed project on vegetation and wildlife will be assessed. The EIR will evaluate the likelihood for any significant biological impacts, including effects on special status plant and animal species, and wetland/special aquatic resources.

The project environmental study limits for the proposed Trinity River Bridges Replacement Project has the potential to support a variety of special-status species (listed and non-listed). Spring and fall chinook salmon, coho salmon, Pacific Lamprey and summer and winter steelhead are known to spawn within the Trinity River, and suitable spawning habitat is available for the species within the study limits of the project. In addition, the Trinity River is also designated as critical habitat for coho salmon by the National Marine Fisheries Service (NMFS). Other special-status and listed species within the project area could potentially include the willow flycatcher, green sturgeon, silky cryptantha, valley elderberry longhorn beetle, northwestern pond turtle, yellow warbler, yellow-breasted chat, bald eagle, and osprey. A comprehensive plant and wildlife survey will be conducted to determine species presence/absence and potential project-related effects to species that are determined to be present. Additionally, a Biological Assessment will be prepared (pursuant to Section 7 of the Federal Endangered Species Act [ESA]) to address impacts to listed salmonid species. A Biological Option (Federal ESA) and Incidental Take Permit (State ESA) will be prepared.

The project environmental study limits support riparian habitat, considered to be a sensitive natural community. Construction activities associated with the proposed Trinity River Bridge Replacement Project would result in the loss of an undetermined acreage of riparian habitat.

Construction activities associated with the proposed project would result in temporary and permanent impacts to wetland features at the Bucktail Bridge site and potentially other sites that may be subject to U.S. Army Corps of Engineer's (ACOE) jurisdiction, pursuant to Section 404 of the Clean Water Act. A delineation of jurisdictional wetlands will be conducted within the project environmental

study limits and a delineation report will subsequently submitted to the ACOE for review and verification, as necessary.

Energy. The EIR will contain an evaluation, in general terms, of the construction and operational requirements of the new bridges and the conservation potential of each alternative.

Cultural Resources. An archaeological study will be conducted within the environmental study limits of the project to determine if any significant archaeological resources are present. The project site does not contain any known cultural resources; however, there may be cultural resources that are currently hidden within the project study limits that could be unearthed and discovered during the construction phase of the project.

The Nor-Rel-Muk Nation, a local unrecognized Indian Tribe, has requested that the project consider acquisition and development of a parking area and access to sacred tribal lands located upstream of the Salt Flat Subdivision, which are located on BLM lands. Issues related to the Nation's access to those lands will be considered in the EIR/EA

Hazards. The replacement and/or modification of the four bridges is not expected to involve the use of hazardous materials and, therefore, will not expose the public to significant hazard. Hazards related to use of the existing bridges during floods are anticipated to be significantly reduced upon project completion.

Land Use. The proposed project is consistent with Trinity County's General Plan and related policies. The parcels served by the bridges will maintain access throughout construction and will be better served through the reduced risk of flooding at the bridges and/or their approaches upon project completion. Growth-inducing impacts are not expected to occur as a result of the project, but will be examined.

Socioeconomic/Displacements/Environmental Justice. Environmental justice, right-of-way acquisition, residential/business displacements, relocation assistance, business impacts, and neighborhood cohesion will be analyzed.

Public Services/Utilities. An analysis of public services and utilities coordination will be included. This will include the possibility of the Salt Flat, Poker Bar and Treadwell bridges being incorporated into the Trinity County road system.

Visual Resources. A Visual Impact Analysis will be included describing the existing visual characteristics of the project area and analyzing any potential visual impacts.

Transportation and Circulation. Transportation and circulation impacts will be analyzed for each of the bridge construction alternatives. A main objective of the project is to provide safe and reasonable year-round access to those parcels served by the bridges.

Construction Impacts. The EIR will identify and analyze any further short-term construction impacts associated with air quality, noise, water quality, traffic congestion and detours, safety, visual, business access, community facilities, etc.

SCOPING PERIOD: The purpose of this scoping period is to provide involved agencies and the public an opportunity to learn about the project and to solicit comments to assist the Lead Agencies in identifying the range of actions, alternatives, mitigation measures, and significant effects to be

analyzed in the EIR/EA. A public review period for the Notice of Preparation has been established from March 31, 2002 through April 30, 2002. Comments should be made in writing and submitted to Tom Stokely at the above address.

Public and agency comments must be received no later than 5:00 p.m. on April 30, 2002. Additionally, a public scoping meeting has been scheduled for April 25, 2002 at 6:30 pm at the Trinity County Free Library, 101 S. Main St., Weaverville, CA.

APPENDIX D

Mitigation Monitoring and Reporting Plan

TRINITY RIVER BRIDGES PROJECT

Draft Mitigation Monitoring and Reporting Program

May 2003

Project Applicant and Lead Agency:
Trinity River Restoration Program
U.S. Department of the Interior – Bureau of Reclamation
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Weaverville, CA 96093

Co-Lead Agencies:
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Redding Field Office
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(California State Agency for CEQA)
Trinity County
Planning Department – Natural Resource Division
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Hayfork, CA 96041

Consultant:
North State Resources, Inc.
5000 Bechelli Lane, Suite 203
Redding, CA 96002

Draft Mitigation Monitoring and Reporting Program

INTRODUCTION

This document represents the Mitigation Monitoring and Reporting Program (MMRP) for the Trinity River Bridges Project. The purpose of providing the MMRP as a stand-alone document in the Draft EA/EIR is to make clear to the reader the mitigation responsibilities of the Bureau of Reclamation (BOR), Bureau of Land Management (BLM), and Trinity County in implementing the Trinity River Bridges Project. The mitigation measures listed herein are required by law or regulation and will be adopted by the Trinity County Board of Supervisors as part of the overall project approval.

Mitigation is defined by both the California Environmental Quality Act (CEQA) – Section 15370 and the National Environmental Policy Act (NEPA) as a measure which:

- Avoids the impact altogether by not taking a certain action or parts of an action
- Minimizes impacts by limiting the degree or magnitude of the action and its implementation
- Rectifies the impact by repairing, rehabilitating, or restoring the impacted environment
- Reduces or eliminates the impact over time by preservation and maintenance operations during the life of the project
- Compensates for the impacts by replacing or providing substitute resources or environments

Mitigation measures provided in this MMRP have been identified in Chapter 3, Affected Environment and Environmental Consequences of the Draft EA/EIR, as feasible and effective in mitigating project-related environmental impacts.

This MMRP includes the discussions on the following: legal requirements, intent of the MMRP, development and approval process for the MMRP, the authorities and responsibilities associated with the implementation of the MMRP, a description of the mitigation summary table, and resolution of noncompliance complaints.

LEGAL REQUIREMENTS AND INTENT OF THE MITIGATION MONITORING AND REPORTING PROGRAM

The legal basis for the development and implementation of the MMRP lies within both CEQA (including the California Public Resources Code) and NEPA. Sections 21002 and 21002.1 of the California Public Resources Code state:

- Public agencies are not to approve projects as proposed if there are feasible alternatives or feasible mitigation measures available that would substantially lessen the significant environmental effects of such projects; and
- Each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so.
- Section 21081.6 of the California Public Resources Code further requires that: the public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of

project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation.

- The monitoring program must be adopted when a public agency makes its findings under CEQA so that the program can be made a condition of project approval in order to mitigate significant effects on the environment. The program must be designed to ensure compliance with mitigation measures during project implementation to mitigate or avoid significant environmental effects.

NEPA 40 CFR Sections 1502.14f requires:

- Agencies shall include appropriate mitigation measures not already included in the proposed action or alternatives

Intent of the Mitigation Monitoring and Reporting Program

The MMRP is intended to satisfy the requirements of CEQA as they relate to the Trinity River Bridges EA/EIR. It is anticipated to be used by BOR, BLM, and County staff, participating agencies, project contractors, and mitigation monitoring personnel during implementation of the project.

The primary objective of the MMRP is to ensure the effective implementation and enforcement of adopted mitigation measures and permit conditions. The MMRP will provide for monitoring of construction activities as needed, on-site identification and resolution of environmental problems, and proper reporting to lead agency staff.

Development and Approval Process

The timing elements for implementing mitigation measures and the definition of the approval process has been provided in detail through this MMRP to assist staff from the BOR, BLM, and County by providing the most usable monitoring document possible.

Authorities and Responsibilities

The BOR, functioning as the Trinity River Restoration Program (TRRP), will have the primary responsibility for the execution and proper implementation of the MRRP. BLM and Trinity County may provide the BOR with support, as warranted. The BOR will be responsible for the following activities:

- Coordination of monitoring activities
- Management of the preparation and filing of monitoring compliance reports
- Maintenance of records concerning the status of all approved mitigation measures

Summary of Monitoring Requirements

Table 1, which follows, summarizes the mitigation measures and associated monitoring requirements proposed for the Trinity River Bridges Project. These mitigation measures are presented in the same form as originally prescribed in the Draft EA/EIR - Chapter 3.0, Affected Environment and Environmental Consequences. The mitigation measures are organized by environmental issue area (i.e., Land Use, Water Quality, etc.), then by project site (i.e., Salt Flat, Bucktail, Poker Bar, and Biggers Road), and

finally by proposed action and associated project build alternatives. **Table 1** is comprised of the following four columns:

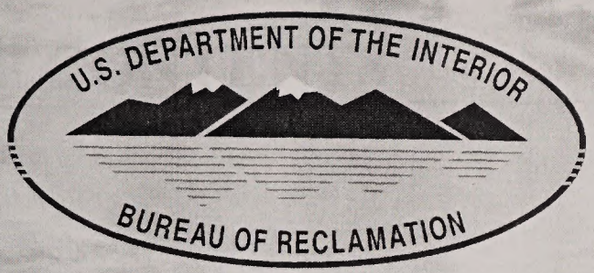
- **Mitigation Measure:** Lists the mitigation measures identified for each significant impact discussed in the Trinity River Bridges EA/EIR. The same mitigation numbering system used in the EA/EIR is carried forward in this MMRP.
- **Timing/Implementation:** Indicates at what point in time or project phase the mitigation measure will need to be implemented.
- **Responsible Party(ies):** Documents which agency or entity is responsible for implementing a mitigation measures and what, if any, agency coordination is required (i.e., approval from CDFG).
- **Verification:** Provides spaces to be initialed and dated by the individual responsible for verifying compliance with each specific mitigation measure.

RESOLUTION OF NONCOMPLIANCE COMPLAINTS

Any person or agency may file a complaint that states noncompliance with the mitigation measures that were adopted as part of the approval process for the Trinity River Bridges Project. The complaint shall be directed to the BOR, via the TRRP office (P.O. Box 1300, 1313 South Main Street, Weaverville, CA 96093), in written form providing detailed information on the purported violation. The BOR shall conduct an investigation and determine the validity of the complaint. If noncompliance with a mitigation measure is verified, the BOR shall take the necessary action(s) to remedy the violation. The complaint shall receive written confirmation indicating the results of the investigation or the final corrective action that was implemented to response to the specific noncompliance issue.

APPENDIX E

Assessment of Permit and Approval Requirements



TRINITY RIVER BRIDGES PROJECT

ASSESSMENT OF PERMIT AND APPROVAL REQUIREMENTS

June 2002

Prepared for
U.S. Department of the Interior
Bureau of Reclamation, Mid-Pacific Region
Northern California Area Office
Shasta Lake, CA 96019
Attn: James DeStaso

TRINITY RIVER BRIDGES PROJECT

Assessment of Permit and Approval Requirements

June 2002

Prepared for:

Bureau of Reclamation
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TRINITY RIVER BRIDGES PROJECT

ASSESSMENT OF PERMIT AND APPROVAL REQUIREMENTS

1. INTRODUCTION

Numerous federal, state, and local permits and approvals may be required for the actions associated with the implementing the Trinity River Bridges Project (Project). The project includes the existing bridges on the Trinity River, as well as several potential ancillary sites. The Salt Flat, Bucktail, Poker Bar and Treadwell bridges will be evaluated in a joint NEPA/CEQA environmental document. Additional ancillary sites may include Rush Creek Delta and Hamilton Ponds that could serve as sources of construction material and other uses for bridge construction.

The NEPA/CEQA process will result in a decision that will require issuance of approvals and entitlements necessary for implementation. Implementation of any of the proposed action alternatives would require the following federal, state, regional and county approvals.

FEDERAL AGENCY PERMITS AND APPROVALS

- U.S. Army Corps of Engineers, San Francisco District
- U.S. Fish and Wildlife Office, Arcata Field Office
- National Marine Fisheries Service, Arcata Field Office
- U.S. Bureau of Land Management, Redding Area Office

STATE AGENCY PERMITS AND APPROVALS

- State Water Resources Control Board
- California Department of Fish and Game
- State Lands Commission
- State Office of Historic Preservation
- North Coast Regional Water Quality Control Board

LOCAL PERMITS AND APPROVALS

- Trinity County Transportation Department
- Trinity County Planning Department

2. SYNOPSIS OF PERMITS AND APPROVALS

FEDERAL AGENCIES

U.S. Army Corps of Engineers - Section 404 Permit

The U.S. Army Corps of Engineers (ACOE) has jurisdictional authority to regulate all activities that dredge, dam or divert navigable waters, or that result in the deposit of dredged and fill material into

waters of the United States. Jurisdictional waters include, but are not limited to, perennial and intermittent streams, lakes, ponds and wetlands. A Section 404 permit from the ACOE will be required pursuant to the federal Clean Water Act (33 United States Code [USC] 1344) if any action involves discharge of dredged or fill material into waters of the United States. The size of the impacts will determine the applicability of Nationwide Permits for this project. A Nationwide Permit 14 is applicable where less than 1/3 acre of jurisdictional waters is affected, and no more than 200 linear feet of fill is discharged into wetland areas. In the event these limits are exceeded, a Standard Individual Permit is required.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) – Endangered Species Act / Magnusun-Stevens Fishery Conservation and Management Act (MSA) Consultation

Under the Endangered Species Act (ESA), the federal action agency is responsible for preparing a Biological Assessment that will determine whether any listed or species proposed for listing are likely to be affected by a proposed action. The action agency initiates Section 7(a) formal consultation with the USFWS and/or NMFS and submit the Biological Assessment if the proposed action may affect listed species.

The MSA, as amended by the Sustainable Fisheries Act of 1996, established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. A component of this consultation process is the preparation and submittal of an EFH Assessment. In instances where MSA and ESA issues overlap, NMFS encourages an integrated approach for consultation.

USFWS and/or NMFS are responsible for preparing a Biological Opinion to determine whether the action would jeopardize the continued existence of listed species or adversely modify their habitat. This Biological Opinion could result in project modifications that ensure that listed species are not jeopardized and that their critical habitat is not modified. Incidental take of listed, threatened or endangered species may be authorized under certain conditions prescribed under the ESA. NMFS has jurisdictional authority for anadromous fish, including the Southern Oregon/Northern California coho salmon, listed as threatened under ESA. The USFWS has jurisdictional authority for the northern spotted owl and bald eagle, listed as threatened under ESA. The USFWS has recently added the yellow-billed cuckoo, a candidate species, to the species list for consideration.

BUREAU OF LAND MANAGEMENT (BLM)

Wild and Scenic Rivers Consultation

The BLM administers the segment of the Trinity River under consideration for this Project. This requires protection of the environmental values of free-flowing rivers from degradation resulting from effects of actions, including those associated with the Project. An evaluation procedure (Wild and Scenic Rivers

Reference Guide, Interagency 1997) is used to make a Determination under Section 7a of the Wild and Scenic Rivers Act.

Federal Land Policy and Management Act

BLM develops policy and maintains federal land use plans for public lands in accordance with the Federal Land Policy and Management Act. The act requires that the agency review and authorize applications for use permits for actions on, or that require access to public lands.

STATE AGENCIES

North Coast Regional Water Quality Control Board (NCRWQCB)- 401 Certification

Section 401 of the Clean Water Act Requires that state water quality standards not be violated by the discharge of fill or dredged material into waters of the U.S. The State Water Quality Control Board (SWQCB) through the NCRWQCB is responsible for issuing water quality certifications, or waivers thereof, pursuant to Section 401 of the Clean Water Act.

North Coast Regional Water Quality Control Board - NPDES Permit

The NCRWQCB regulates point source and non-point source discharges through the National Pollutant Discharge Elimination System (NPDES). NPDES permits are required for storm water discharges from construction sites involving more than five acres or containing a hazardous substance in excess of reportable quantities established by the Environmental Protection Agency (EPA). The type of application and information required is dependent on the type of discharge activity proposed.

North Coast Regional Water Quality Control Board – Dewatering Permit

A dewatering permit (Order No. 5-00-175, General Order for Dewatering and other Low Threat Discharges To Surface Waters) may be required for dewatering discharges associated with construction projects. The dewatering permit is required for the removal of water from excavations, cofferdams, diversions and areas of ponding that is eventually discharged to a storm drain or surface watercourses. General construction dewatering may contain settleable materials, suspended material, color and turbidity, which may have an impact on surface waters. If water is encountered in an excavation it will be most likely need to be removed. A General Dewatering Permit is required prior to a discharge from dewatering.

State Water Resources Control Board - File Statement

The Aboveground Petroleum Storage Act with 1991 Amendments requires owners and operators of aboveground petroleum storage tank facilities with a single tank capacity greater than 660 gallons, or with a cumulative storage capacity of greater than 1,320 gallons, to file a storage statement with the SWRCB. The level of construction activity will determine the applicability of this statute.

CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG)

CESA Section 2090 Consultation

The California Endangered Species Act (CESA) requires the California Department of Fish and Game (CDFG) to engage in formal consultation on any project that has a state lead agency. Section 2090 requires the CDFG to prepare a Biological Opinion (BO) on these projects. If there is federal involvement in the project, CDFG has provisions to participate in the federal consultation process and utilize the BO prepared by the federal responsible agency.

CESA Section 2081 Take Authorization

Section 2081 of CESA provides for a take authorization for activities not connected to a state agency serving in a CEQA lead agency capacity. Although this process is currently under judicial review, it is anticipated that this authorization may be required for the Trinity River Bridges Project since the county will be serving as the lead CEQA agency.

Section 1600 Lake and Streambed Alteration Agreement

The CDFG regulates work that will substantially affect resources associated with rivers, streams and lakes in California, pursuant to Section 1600-1607 of the Fish and Game Code. Section 1601 is applicable for a public project that substantially diverts obstructs, or changes the natural flow of the water body or uses material from a streambed.

State Historic Preservation Officer - Section 106 Consultation

Section 106 of the National Historic Preservation Act (NHRA) requires an agency to coordinate with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) regarding the effects a project may have on properties listed or eligible for listing under the National Register for Historic Places. This consultation includes existing features (bridges, structures) as well the area that may be incorporated into the project. The result of this consultation is the protection of historic, cultural and archaeological resources of importance.

State Lands Commission - Land Use Lease

The State Lands Commission (SLC) has jurisdiction and management control over public lands identified as sovereign. These lands include submerged lands and beds of navigable rivers, streams, and lakes that are managed for the benefit of all people of the state. SLC 's Land Management Division administers the surface uses of state-owned sovereign lands.

TRINITY COUNTY

Transportation Department - Fire Safe Ordinance

The Fire Safe Ordinance authorizes the County to approve road construction or reconstruction pursuant to Article 1. Article 2 defines the requirements for Emergency Access, including road width, roadway turnarounds and roadway structures.

Transportation Department - Decomposed Granite Grading Ordinance

This ordinance requires a grading permit from the Trinity County Transportation department prior to construction of new roads or excavation in areas with decomposed granite soils, which includes the Shasta Batholith of decomposed granite soils. This ordinance applies only to private lands under the jurisdiction of Trinity County. It does not apply to federally managed lands.

Planning Department - Floodplain Management Ordinance

This ordinance requires a Floodplain Development Permit. This permit certifies that construction or replacement of bridges, roadways, and bank slope protection devices will not cumulatively increase floodwaters of the stream by more than one foot in the project area.

3. APPLICABLE PERMITS AND APPROVALS

The EIR/EA will be structured to address specific requirements for each permit and approval necessary to implement the project. Table 1 displays the applicable permits and approvals for alternative scenarios identified in the preliminary scoping process. These scenarios include:

1. No Action
2. Rehabilitation/Modification
3. New Location
4. Overland Access

Many other agencies may have review or oversight responsibilities over the project, EIR/EA or permits, but do not directly issue permits or approvals for the Project.

TABLE 1
PROJECTED FEDERAL, STATE, AND LOCAL PERMITS AND APPROVALS

Agency	Type of Permit or Approval	Alternative Scenarios	Regulated Activity	Review Period	Authority
Federal Agency Permits and Approvals					
U.S. Army Corp of Engineers	Department of the Army Permit (Section 404)	2,3 (<1/3 acres affected requires individual permit)	Discharge of dredged or fill material into waters of the U.S.	Three to six months after certification of the Final EIR/EA	Section 404 of the Clean Water Act (33 USC 1344)
USFWS and/or NMFS	Section 7 Consultation, Biological Opinion	2,3,4 (required for either terrestrial or aquatic TE&S Species	Impacts to TE&S species and/or critical habitat	Six to eight months after certification of the Final EIR/EA	Section 7 of the Endangered Species Act
Bureau of Land Management	Determination under Section 7 of the W&S Rivers Act	2,3 (activities that effect bed and/or bank)	Actions that will have a negative effect on the ORV's	Three to six weeks after FONSI	Section 7of the Wild and Scenic Rivers Act
Bureau of Land Management	Use Permit issued under FLPMA	3 (actions that affect public lands)	Action on or requiring access to public lands	Two to four weeks after FONSI	Federal Land Policy and Management Act

TABLE 1
PROJECTED FEDERAL, STATE, AND LOCAL PERMITS AND APPROVALS

Agency	Type of Permit or Approval	Alternative Scenarios	Regulated Activity	Review Period	Authority
State of California					
North Coast Regional Water Control Board	Section 401 Water Quality Certification	2,3	Discharge of dredged or fill material into waters of the U.S.	Three to six months after certification of the Final EIR/EA	Section 401 of the Clean Water Act (33 USC 1344)
North Coast Regional Water Control Board	General Construction Stormwater NPDES Permit	2,3,4	Stormwater discharges for activities in excess of 5 acres	Prior to construction CEQA Dependent	Clean Water Act (33 USC 1344)
North Coast Regional Water Control Board	General Dewatering Permit	2,3,4	Dewatering excavations with discharge to Surface Waters	Prior to construction CEQA Dependent	Order No. 5-00-175, General Order for Dewatering
State Water Resources Control Board	Aboveground Petroleum Storage Statement	2,3,4	660 gallons each or 1320 gallons cumulative capacity	Prior to construction	Aboveground Petroleum Storage Act, 1991
California Department of Fish and Game	CESA Section 2090 Consultation	2,3,4	Participate in consultation for CESA TE&S species	Biological Opinion within 45 to 135 days after EIR certified	Section 2090 of the California Fish and Game Code
California Department of Fish and Game	Section 2081 Management Authorization	2,3,4	Action may result in Take of species under CESA	Within two to three months after EIR certification	Section 2081 of the California Fish and Game Code
California Department of Fish and Game	Section 1600 Lake or Streambed Alteration Agreement	2,3	Action that substantially affects the natural flow or uses material from the streambed	Within one to two months after EIR certification	Section 1600 of the California Fish and Game Code
State Office of Historic Preservation	Section 106 Review and Compliance	1,2,3,4	Action that may affect historic places or properties	Within six months after FONSI/EIR certification	National Historic Preservation Act 36 CFR 800
State Lands Commission	Land Use Lease	2,3	Action that may affect sovereign lands under jurisdiction	Within two to six months after EIR certification	California Public Resources Code

TABLE 1
PROJECTED FEDERAL, STATE, AND LOCAL PERMITS AND APPROVALS

Agency	Type of Permit or Approval	Alternative Scenarios	Regulated Activity	Review Period	Authority
Trinity County					
Trinity County Transportation Department	Fire Safe Ordinance Authorizes road construction and emergency access	1,2,3,4	Actions that will affect emergency road access	Within two to six weeks after EIR certification	Trinity County General Plan Safety Element
Trinity County Transportation Department	Grading Permit	2,3,4	Required for construction actions on granitic soils	Within two to six weeks after EIR certification	Trinity County Decomposed Granite Grading Ordinance
Trinity County Planning Department	Floodplain Development Permit	1,2,3	Certifies that actions will not increase floodwaters by more than one foot in project area	Within two to six weeks after EIR certification	Trinity County Floodplain Management Ordinance

The review period will vary greatly depending upon the regulated activity, type of permit or review period involved, and established procedures of the reviewing agency. The time required to complete the review and /or obtain a permit could range from one day to over one year.

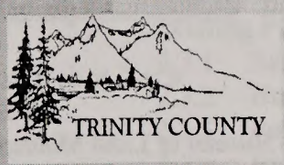
APPENDIX F

Biological Assessment/ Essential Fish Habitat Assessment

TRINITY RIVER BRIDGES PROJECT

Administrative Draft #2
Environmental Assessment/Environmental Impact Report

April 1, 2003



TRINITY RIVER BRIDGES PROJECT

Biological Assessment/Essential Fish Habitat Assessment

March 12, 2003

Location:
Trinity County, California
Township 33N, Range 9W, Sections 13, 23, 32, 33, and 34, MDBM
USGS *Weaverville* and *Lewiston* 7.5-Minute Quadrangles

Project Applicant and Lead Agency:
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Trinity River Bridges Project - Biological Assessment / Essential Fish Habitat Assessment

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Section 1

Introduction

The purpose of this Biological Assessment (BA) / Essential Fish Habitat Assessment (EFHA) is to review the proposed Trinity River Bridges Project in sufficient detail to determine to what extent the proposed action may affect any of the threatened, endangered, or proposed species listed below. This BA/EFHA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (16 United States Code [USC] 1536[c]), Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act, and Sections 2080 and 2081 of the California Fish & Game Code.

The four sites evaluated in this BA/EFHA are Salt Flat, Bucktail, Poker Bar, and Biggers Road bridges on the Trinity River, below Lewiston Dam. Project descriptions, effects, and conservation measures are presented separately for each site.

1.1 Threatened, Endangered, Proposed Threatened or Proposed Endangered Species

The following listed species may be potentially affected by the proposed action:

- federally- and state-threatened Southern Oregon / Northern California coasts (SONCC) Evolutionarily Significant Unit (ESU) coho salmon (*Oncorhynchus kisutch*), listed on May 6, 1997 (62 CFR 24588)

1.2 Critical Habitat

The action addressed within this BA/EFHA falls within designated Critical Habitat for the federally-threatened SONCC ESU coho salmon. Critical habitat for this species was designated by the National Marine Fisheries Service (NMFS) on May 5, 1999 (64 CFR 24049).

1.3 Regulatory Context

1.3.1 Federal Endangered Species Act

For purposes of this BA, special-status species include those taxa that are listed, or are proposed for listing as threatened, or endangered by the NMFS under the federal Endangered Species Act (ESA). The ESA protects federally listed threatened and endangered species. Section 9 of the ESA prohibits acts of disturbance that result in the "take" of threatened or endangered species. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Violation of this section can result in penalties of up to $50,000 and up to one year of imprisonment. Sections 7 and 10(a) of the ESA provide a method for permitting an action that may result in an "incidental take" of a federally listed species. Incidental take refers to take of a listed species that is incidental to, but not the primary purpose of, an otherwise lawful activity. Incidental

take is permitted under Section 7 for projects on federal land or involving a federal action, while Section 10(a) provides a method for permitting an incidental take resulting from a state or private action. Information provided by this BA will be used by NMFS to make a determination on project effects to listed species.

1.3.2 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. EFH refers to those waters and substrates necessary for spawning, breeding, feeding, or growth to maturity. As defined, the term "waters" includes aquatic areas (and their associated physical, chemical, and biological properties) that are used by fish or, where appropriate, have historically been used by fish. The term "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required for a sustainable fishery and the managed species' contribution to a healthy ecosystem. Finally, "spawning, breeding, feeding, or growth to maturity" refers to a species' full life cycle. "Adverse effect" means any impact that reduces the quality and/or quantity of EFH, and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Freshwater EFH for anadromous salmonids consists of four major components: spawning and incubation; juvenile rearing; juvenile migration corridors; and adult migration corridors and adult holding habitat (PFMC 2000). Important components of EFH for spawning, rearing, and migration include adequate substrate composition; water quality (e.g., dissolved oxygen, nutrients, temperature, etc.); water quantity, depth, and velocity; channel gradient and stability; food; cover and habitat complexity (e.g., large woody debris, pools, channel complexity, aquatic vegetation, etc.); space; access and passage; and flood plain and habitat connectivity (PFMC 2000).

The MSA requires federal agencies to consult with NFMS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA §305[b][2]). A component of this consultation process is the preparation and submittal of an EFH Assessment. The length of the EFH Assessment will vary based on project complexity and magnitude of potential impacts to EFH, but all EFH Assessments must include the following information:

- A description of the proposed action
- An analysis of the effects, including cumulative effects, of the proposed action on EFH, the managed species, and associated species, such as major prey species, including affected life history stages
- The federal agency's views regarding the effects of the proposed action on EFH
- Proposed mitigation, if applicable

In instances where MSA and ESA issues overlap, NMFS encourages an integrated approach for consultation.

The EFH mandate applies to all species managed under a federal fishery management plan (FMP). For the Pacific Coast (excluding Alaska), there are three FMPs covering groundfish, coastal pelagic species, and Pacific salmon. For the Trinity River Bridges Project, the U.S. Bureau of Reclamation (Reclamation) and the U.S. Bureau of Land Management (BLM) as the federal lead agencies will need to consider the impact of the proposed action on EFH for coho and chinook salmon in the Trinity River, if applicable, pursuant to the Pacific Coast Salmon FMP.

This BA/EFHA has been prepared by Reclamation, BLM, and Trinity County (County) to identify and describe potential impacts of the proposed Trinity River Bridges Project upon fishery resources that are listed under the federal Endangered Species Act (ESA). The Trinity River is known to support federally- and state-listed as threatened SONCC ESU coho salmon.

This document has also been prepared in conformance with the 1996 amendments to the MSA, (Code of Federal Regulations [CFR] 62[244] December 19, 1997), to address potential impacts to EFH for coho and chinook salmon, pursuant to the Pacific Coast Salmon Plan.

Reclamation, BLM, and the County, as lead agencies, will be preparing an Environmental Assessment (EA) /Environmental Impact Report (EIR)/to comply with the National Environmental Policy Act (NEPA), and California Environmental Quality Act (CEQA) respectively.

The BA/EFHA is intended for use by Reclamation, BLM, and the County for submission to NMFS, as required under Section 7(c) of the Federal Endangered Species Act (FESA) and Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act. Additionally, information contained in this BA/EFHA will facilitate consultation between the Reclamation, BLM, the County and the California Department of Fish and Game (CDFG) as part of the incidental take permit process (Sections 2080, 2081, of the California Fish and Game Code), if warranted. If CDFG finds that an incidental take permit is required, Reclamation and the County may request a consistency determination from CDFG under Fish and Game Code 2080.1.

1.4 Consultation To Date

Provided below is a summary of the informal consultation conducted between Reclamation and NMFS:

- **September 2001** – E-mail exchange between P. Uncapher, NSR, Inc. (consultant to Reclamation) and M. Kelly, NMFS-Arcata regarding Section 7 consultation procedures required under the 2000 Biological Opinion for the Trinity River Mainstem Fishery Restoration Program EIS/EIR Record of Decision (TRMFRP ROD).

- **September 2002** – Phone conversation between K. Marine, NSR, Inc. (consultant to Reclamation) and M. Kelly, NMFS-Arcata regarding level of consistency of the bridge replacement projects with the Reasonable and Prudent Measures outlined in the 2000 Biological Opinion on the TRMFRP ROD, and necessary level of consultation for these projects.

- **September 2002** – Discussion between K. Marine, NSR, Inc. (consultant to Reclamation) and H. Rectenwald, CDFG-Redding, regarding recent recommendation of CDFG to list SONCC ESU coho salmon under the California Endangered Species Act (CESA), and any necessary consistency procedures with the federal ESA.

- **September 2002** – Field site visit to the four proposed bridge replacement sites with representatives of Reclamation, BLM, NMFS (M. Kelly-Arcata), and CDFG (B. Webb-Redding) to discuss ESA- and CESA-related issues that need to be addressed in the design, environmental documentation, and construction of the four Trinity River bridges.

- **December 2002** – E-mail exchange and phone conversation between B. Gutermuth, (Reclamation) and M. Kelly, (NMFS-Arcata) regarding effects of the December 2002 U.S. District Court decision affecting the Trinity River Fishery Restoration Program. NMFS interpreted the Court's ruling as follows, "Bank projects appear to be adequately described in the Trinity River Mainstem Fishery Restoration EIS so that impacts would be covered by the Mainstem BO. Bridge impacts, however, need more detail so that impacts can be adequately described. Consequently, the bridge projects will require a stand alone BO."

- **January 2003** – E-mail exchange and phone conversation between B. Gutermuth (Reclamation) and M. Kelly, (NMFS-Arcata), regarding coordination on conservation measures applicable to transportation projects (i.e., bridge replacement) necessary to avoid and minimize effects to SONCC ESU coho salmon.

1.5 Current Management Direction

Management plans created by CDFG, NMFS, and U.S. Fish and Wildlife Service (USFWS) provide the primary management direction established for the protection of federally listed species. Several of these programs/plans are described below.

1.5.1 Trinity River Mainstem Restoration Program

The Trinity River is a major tributary of the Klamath River system and has been subject to extensive water development as part of the federal Central Valley Project (CVP). Efforts have been underway since the Trinity River Division of the CVP (TRD) was constructed to mitigate its adverse affects on salmonid habitat. The Trinity River Mainstem Fishery Restoration Program (TRMFRP) EIS/EIR, completed in 2000, resulted in a Federal Record of Decision (ROD) to implement a restoration program consisting of "a combination of managed high flow releases, mechanical riparian berm removal, and gravel augmentation to redirect geomorphic processes so that a more complex channel form will evolve, creating the mosaic of aquatic habitats necessary to enhance freshwater salmonid production" (USFWS and HVT 1999). A December 2002 U.S. District Court (Court) decision ruled that the ROD flow regime was "arbitrary" and capped Trinity River instream flow deliveries at 452,600 acre feet, an amount similar to that prescribed for dry years by the ROD. In this ruling, the Court ordered the Interior Department to re-evaluate the ROD's flow prescriptions, their impacts on the CVP service area, and complete a supplemental environmental study for the TRMFRP, which is expected in 2003 (*Westlands Water District, San Luis & Delta-Mendota Water Authority, and San Benito Water Authority, et al.* v. *U.S. DOI, et al.*, CIV-F-00-7124 OWW DLB, U.S. District Court, Eastern District of California, 2002).

However, the Court also ordered that all non-flow measures prescribed by the ROD, such as bank and channel restoration and necessary bridge replacement, shall be allowed to proceed. The Court's ruling reiterated two previous findings by the Court that the ROD's non-flow measures create no harm and provide an overwhelming benefit to the Trinity River fishery and for the U.S. government's need to discharge its federal trust obligation owed to the Indian Tribes (*Westlands Water District, San*

Luis & Delta-Mendota Water Authority, and San Benito Water Authority, et al. v. *U.S. DOI, et al.*, CIV-F-00-7124 OWW DLB, U.S. District Court, Eastern District of California, 2002). These non-flow river restoration measures include development of approximately 45 potential restoration activity sites, where sediment management and channel modification efforts are being planned. These projects are being planned and implemented by the Trinity River Restoration Program (TRRP), with oversight from the Trinity Management Council (TMC). The TRRP has two distinct program elements; 1) the Rehabilitation and Implementation Group (RIG), responsible for project development, engineering, and regulatory compliance; and 2) the Technical Modeling and Analysis Group (TMAG), responsible for project development, monitoring, and integrating activities in an adaptive management framework. A number of federal, state and local participants are involved at both, the policy and project level. Active participants include; Reclamation, USFWS, NFMS, U.S. Forest Service, BLM, California Resources Agency, Trinity County, and the Hoopa Valley and Yurok tribes.

A biological opinion issued on the TRMFR Program in 2000 found that the program "*is not likely to jeopardize the continued existence of* [SONCC ESU] *coho salmon*", and "*is not likely to destroy or adversely modify critical habitat for the* [SONCC ESU] *coho salmon*". Included in this biological opinion was an incidental take statement which included terms and conditions to implement Reasonable and Prudent Measures (RPM) to, "*Ensure that the replacement bridges* [addressed by this biological assessment] *and other infrastructure modifications,...,are designed and completed as soon as possible*". This RPM is necessary to accommodate river flows of the magnitude prescribed for fluvial channel maintenance that can support anadromous fish habitat restoration in the Trinity River (USFWS and HVT 1999).

1.5.2 California Coastal Salmonid Restoration Program / Five Counties Salmon Conservation Program

In 1997, CDFG established the Salmonid Restoration Program for coastal watersheds. Initiatives included in this program support; watershed planning projects at a local level, coastal salmon and anadromous trout habitat restoration, and improved efforts to manage anadromous salmon. The program includes a Salmon and Steelhead Trout Restoration Account, to be expended on a wide range of issues including; watershed planning, on-the-ground habitat restoration projects, and other restoration-related efforts for restoring salmonid populations. This fund also finances a Watershed Restoration and Protection Council that 1) oversees State watershed protection and enhancement activities, and 2) directs and develops a Watershed Protection Program to provide for anadromous salmonid conservation.

Trinity County is participating in the Salmonid Restoration Program through the Five Counties Salmon Conservation Program. The Five Counties Program, consisting of Trinity, Del Norte, Siskiyou, Humboldt, and Mendocino counties, is coordinating and prioritizing restoration projects and developing standard practices to prevent degradation of salmonid habitat resulting from county road projects. The NMFS has nominated the Five Counties Program for the Governor's Environmental and Economic Leadership Award in the area of Watershed Management, for "laudable efforts of restoring, enhancing, and improving California's watersheds, while promoting sustainable economic progress."

The Five Counties group has inventoried fish passage barriers at County road crossings and sediment delivery sources along County roads. Prioritized projects were identified to improve fish passage, and reduce sediment delivery to both salmonid bearing and non-salmonid bearing streams in the Trinity, Klamath, Eel, Mad, Van Duzen, Redwood Creek, Smith, Gualala and other major coastal watersheds. Fish barriers have been removed at a rate of 5 to 10 per year for the last 3 years, and future projects are in the planning and design stage. Sediment reduction projects have been planned and implemented in a number of locations as part of this program. The group has prepared a Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds, several drafts of which have been reviewed and commented on by NMFS, CDFG and the North Coast Regional Water Quality Control Board. With these agencies' concurrence, the final Manual will be circulated for public review and presented to the Board of Supervisors from each County for adoption as County policy.

1.5.3 Federal Land and Resource Management Plans

The Shasta-Trinity National Forest (USFS) and the Redding Resource Area (BLM) administer lands along the Trinity River and throughout its watershed. Both agencies' management plans (BLM 1993, as amended; USFS 1995) incorporate standards and guidelines for rigorous watershed analysis, land use planning, and resource conservation and protection prescribed by the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (NSO ROD). The *Aquatic Conservation Strategy* derived from the NSO ROD and adopted by the Shasta-Trinity National Forest's and the Redding Resource Area's respective management plans provides guidance for improved management and conservation of aquatic and associated riparian resources to "*maintain and restore*" physical processes and biological conditions necessary to support and benefit life history requirements of aquatic and riparian-dependent species, including threatened, endangered, and sensitive species (USDA and DOI 1994).

The BLM now manages the approximately 17,000 acre Grass Valley Creek watershed, acquired in the late 1990's, primarily for watershed rehabilitation purposes. Grass Valley Creek is a tributary to the Trinity River about 12 miles downstream of Lewiston Dam. The Grass Valley Creek watershed is underlain by highly erosive decomposed granite that was subjected historically to disturbance by intensive logging and road-building, increasing sediment loads carried into the Trinity River by the creek, where it contributed to reductions of habitat quality for anadromous fish. Land stabilization and forest rehabilitation work is ongoing building on past federal and state efforts to control and reduce erosion and sediment contributions of this watershed to the Trinity River (i.e. Buckhorn debris dam, Hamilton sediment ponds, and Natural Resource Conservation Service's cooperative erosion control projects).

1.5.4 Clean Water Act Section 303(d) Total Maximum Daily Load (TMDL) Requirements

A TMDL and accompanying source allocation for sediment in various reaches and tributaries of the Trinity River has been established to comply with Section 303(d) of the Clean Water Act, because the State of California determined that the water quality standards for the Trinity River have been consistently exceeded due to excessive sediment. A number of contributing causes were identified including; historic mining effects, past roading-activities, certain timber-harvesting practices, and the concomitant effects of reduced bed-mobilizing river flows, due to the TRD, on sediment transport

(EPA 2001). In 2001, the Environmental Protection Agency (EPA) established the TMDL, with assistance from North Coast Regional Water Quality Control Board staff (EPA 2001). The primary adverse impacts associated with excessive sediment in the Trinity River pertain to the beneficial uses ascribed to anadromous salmonid fish habitat. The main responsibility for water quality management and monitoring resides with the State. EPA now expects the State to develop and submit implementation measures to EPA as part of revisions to the State water quality management plan, as provided by EPA regulations at 40 C.F.R. Sec. 130.6.

1.5.5 Other Management Activities

Since 2000, NMFS and the State of California, under a Memorandum of Agreement, have been reviewing California's forest practice rules, their implementations, and enforcement, in an attempt to improve forestry practices in the state. This effort has been critical to improving habitat conditions in coastal watersheds, particularly for anadromous salmonids.

Since the mid-1990's, sport and commercial harvest of coho salmon in California ocean and inland waters was incrementally restricted, and within the last 5 years prohibited statewide. State hatchery practices for anadromous salmonids, including listed coho salmon, have also been reviewed and changes implemented to reduce the effects of hatchery fish on natural production (CDFG 2001). During 2002, CDFG recommended to the state Fish and Game Commission that the SONCC ESU coho salmon be listed under CESA (CDFG 2002b). This recommendation is currently under review while a recovery plan and implementing regulations are formulated.

Section 2

Description of the Proposed Action

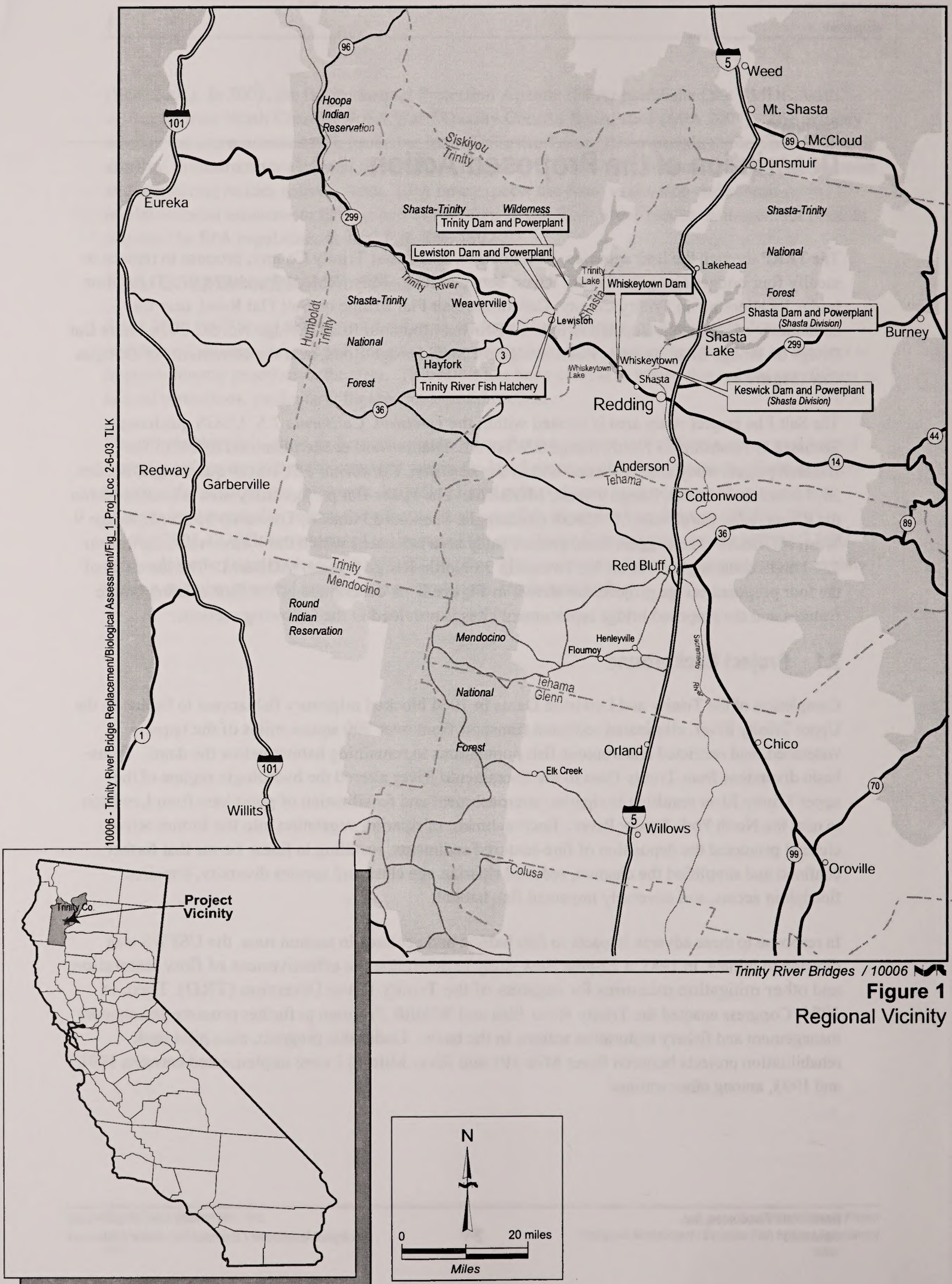
The TRRP through the lead agencies, Reclamation, BLM, and Trinity County, propose to replace or modify four bridges along the Trinity River, between River Mile (RM) 107 and RM 97. These four bridge locations are in Trinity County, California: Salt Flat Bridge on Salt Flat Road, near the community of Lewiston; Bucktail Bridge on Browns Mountain Road (Bridge No. 5C-207); Poker Bar Bridge on Bridge Road; Biggers Road Bridge off Steel Bridge Road, near the community of Douglas City (**Figure 1**).

The Salt Flat project study area is located within the *Lewiston, California* 7.5' USGS quadrangle, Section 13, Township 33 North, Range 9 West, Mt. Diablo Base & Meridian (MDB&M). The Bucktail project study area is located within the *Lewiston, California* 7.5' USGS quadrangle, Section 23, Township 33 North, Range 9 West, MDB&M. The Poker Bar project study area is located within the *Weaverville, California* 7.5' USGS quadrangle, Sections 33 and 34, Township 33 North, Range 9 West, MDB&M. The Biggers Road project study area is located within the *Weaverville, California* 7.5' USGS quadrangle, Section 32, Township 33 North, Range 9 West, MDB&M. The locations of the four proposed bridge projects are shown in **Figure 2**. A description of the four existing bridge features and the proposed bridge replacement sites is provided in the following sections.

2.1 Project Background

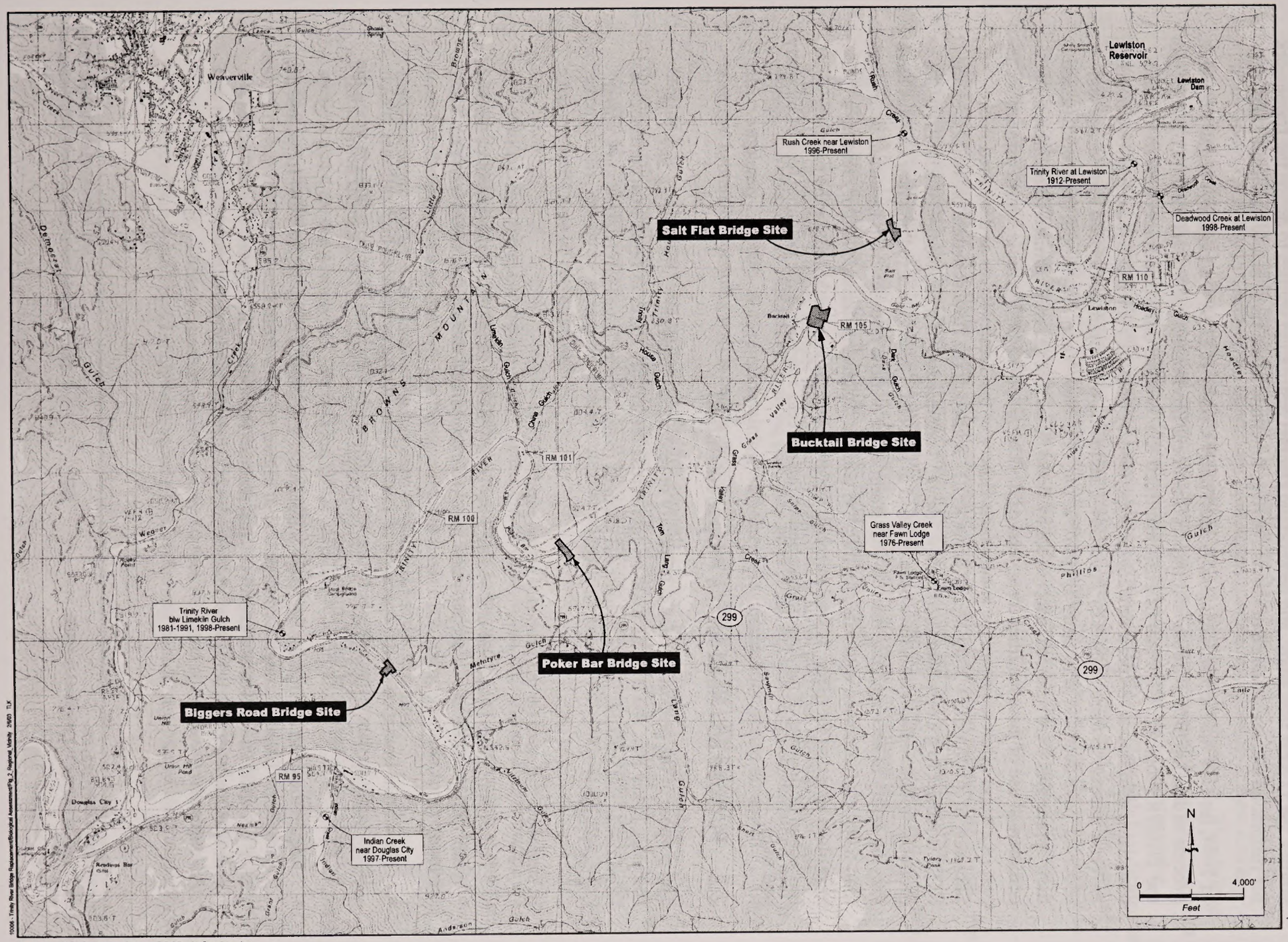
Completion of the Trinity and Lewiston Dams in 1964 blocked migratory fish access to habitat in the Upper Trinity River, eliminated sediment transport from over 700 square miles of the upper watershed, and restricted anadromous fish populations to remaining habitat below the dams. Trans-basin diversions from Trinity Dam to the Sacramento River altered the hydrologic regime of the upper Trinity River resulting in riparian encroachment and fossilization of point bars from Lewiston to near the North Fork Trinity River. Encroachment of riparian vegetation into the former active channel promoted the deposition of fine-textured sediments, resulting in linear berms that further confined and simplified the channel, reduced riparian age class and species diversity, impaired floodplain access, and adversely impacted fish habitat.

In response to these adverse impacts to fish habitat and declines in salmon runs, the USFWS was directed to initiate, in 1981, a 12-year flow study to determine the effectiveness of flow restoration and other mitigation measures for impacts of the Trinity River Diversion (TRD). Then, in 1984, Congress enacted the Trinity River Fish and Wildlife Program to further promote and support management and fishery restoration actions in the basin. Under this program, nine pilot bank rehabilitation projects between River Mile 101 and River Mile 111 were implemented between 1991 and 1993, among other actions.



Trinity River Bridges / 10006

Figure 1
Regional Vicinity



Source: U.S. Geological Survey, 7.5-Minute Quadrangles
Lewiston, CA (40122f7); Weaverville, CA (40122f8)

10006 - Trinity River Bridge Replacement/Biological Assessment/Fig 2_Regional_Vicinity_20051 TIF

Trinity River Bridges Project / 10006

Figure 2
Project Location

In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA), which provided for completion of the Trinity River Flow Evaluation Study (TRFE). The resulting TRFE Final Report, published in 1999 by the USFWS and the Hoopa Valley Tribe, integrated the results of biological studies, the 12-year flow study, and geomorphic channel restoration studies to define the framework for restoration and maintenance of normative river functions in the river below Lewiston Dam.

In 1994, the USFWS (NEPA lead agency) and Trinity County (CEQA lead agency) began the public process to develop the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the TRMFR Program. The Final EIS/EIR identified four bridges that were susceptible to impacts associated with floods and peak flow levels prescribed by the ROD for fish habitat improvements. Adverse impacts to these bridges by flood flows, including overtopping, flooded approaches and scouring, have occurred as recently as 1997. In the 1997 New Years Day flood, these bridges and their approaches were rendered inaccessible by flood flows that severely limited residential and commercial use of these facilities for several days. The proposed bridge replacement project is one part of a larger effort to restore the anadromous fishery of the Trinity River as described in the Secretary of the Interior's 2000 Trinity River ROD. Although the flow schedule prescribed by the ROD is subject to a Court-mandated review (pending completion of a supplemental EIS/EIR), the proposed bridge replacements have been ordered to proceed. As constructed, the four bridges have varying ability to accommodate the 100-year storm event or flow releases from Lewiston dam greater than 6,000 cfs (combined with tributary inflows) without sustaining damage and/or creating a hazardous situation for users. If implemented, the proposed project could reduce the existing likelihood of flooding of the four bridges and/or their access roads, and the potential loss of property and lives.

2.2 Purpose and Need for the Proposed Action

The purpose of the proposed action is to modify or replace, as necessary, the existing Salt Flat, Bucktail, Poker Bar, and Biggers Road bridges across the Trinity River in order to accommodate large floods and possible future operational changes to the Trinity River Division of the Central Valley Project.

In summary, the need for the proposed action results from:

- The existing high likelihood of flooding (pre-Trinity ROD) of the four bridges and/or their access roads with potential loss of property and lives (as exemplified during the 1997 New Year's Day Flood).
- The current limitation on the operation of Trinity Dam during periods of high inflows, which limits safety of dam water releases to the Trinity River via Lewiston Dam to 6,000 cfs when the actual release capacity of the Trinity Dam is 13,750 cfs.
- Requirements in the Interior Secretary's December 29, 2000, Trinity River ROD to restore the Trinity River fishery through a combination of higher releases from Lewiston Dam (up to 11,000 cfs), floodplain infrastructure improvements, channel rehabilitation projects, fine and coarse sediment management, watershed restoration, and an Adaptive Environmental Assessment and Management Program.

2.3 Existing Facility Conditions

2.3.1 Salt Flat Bridge

Reclamation is proposing to replace the Salt Flat Bridge on Salt Flat Road to minimize flood losses, allow more flexibility in Trinity Dam operations, and accommodate increased river flow levels prescribed by the ROD. The layout for the proposed project is illustrated in **Figure 3.** This bridge does not currently meet recommended design standards for water conveyance and debris clearance at the maximum prescribed flows, and the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed flows (Omni-Means, LTD 2000). The Salt Flat Bridge on Salt Flat Road is located approximately 1000 feet west of Goose Ranch Road and 2.5 miles west of Lewiston, California at RM 107. The bridge, which was reportedly constructed in the early 1980s to replace a bridge that had been washed out, is a privately-owned structure that serves 27 parcels located on the right (west) bank of the Trinity River.

The existing structure is a single lane, 272-foot-long, 10-foot-wide, four-span railway car bridge. For discussion purposes, the four spans are numbered 1 through 4, from left to right (east to west), looking downstream. The span lengths are approximately 85.5 feet, 85.5 feet, 52.0 feet and 51.0 feet, respectively. The left (east) abutment is abutment 1, and the right (west) abutment is abutment 2. The piers are numbered 1 through 3, from left to right (east to west).

Currently, abutment 1 is not visible; it is obscured by fill or alluvial material consisting of sand, gravel, and cobbles. A concrete or steel support may be present, but has not been examined as it is also completely covered. A concrete retaining wall/steel pile combination forms abutment 2. The material behind the retaining wall is coarse-grained fill consisting of gravel and cobbles.

Steel H-pile trestle-type piers support the bridge superstructure. Piers 2 and 3 each have a v-shaped debris diverter constructed with steel plates and beams on the upstream nose. River flows may have scoured several feet deep into the alluvium to expose the steel piles beneath the debris deflectors. Alternatively, the diverters may have been constructed for high flows only, leaving the lower piling exposed at the time of construction.

It is assumed that the existing piers were constructed in 1984, when the railroad flatcar bridge was reportedly installed. However, the right abutment appears to be much older. According to the Salt Flat Property Owners Association, the bridge has been subjected to heavy loads, such as loaded ten-wheeled dump trucks and concrete trucks, on a regular basis each spring/summer for property and roadway improvements. No load rating has been developed for the structure.

The railroad flatcars used for spans 1 and 2 (left-side) are of the same type, and the ones used for spans 3 and 4 are the same type. The railroad flatcar depths are approximately 39 inches (3.25 feet), with a low chord elevation of 1776.6 feet along spans 3 and 4.

The decking for left-side spans 1 and 2 consists of ¼ -inch thick steel plate. Decking on right-side spans 3 and 4 consists of 3-inch wide by 4-inch high wood beams, placed perpendicular to the direction of traffic. These beams are approximately 10 feet long and spaced about 4-inches apart. Two rows of four 4-inch by 12-inch wide wood planks (running boards) are placed longitudinally on

top of the deck. Spans 1 and 2 have a low steel curb, approximately 8-inches high, on the outer edges. Steel posts and wire rope form a railing along both sides between spans 3 and 4.

The river channel at the Salt Flat Bridge site is divided during low flows, separated by a 70-foot-wide channel bar deposit. The right channel is the main channel, and is approximately 110 feet wide where it passes under bridge spans 3 and 4 and the right side of span 2. The left channel, which was constructed by Reclamation for fish spawning and habitat purposes in the early 1990s, is approximately 30 feet wide where it passes under span 1.

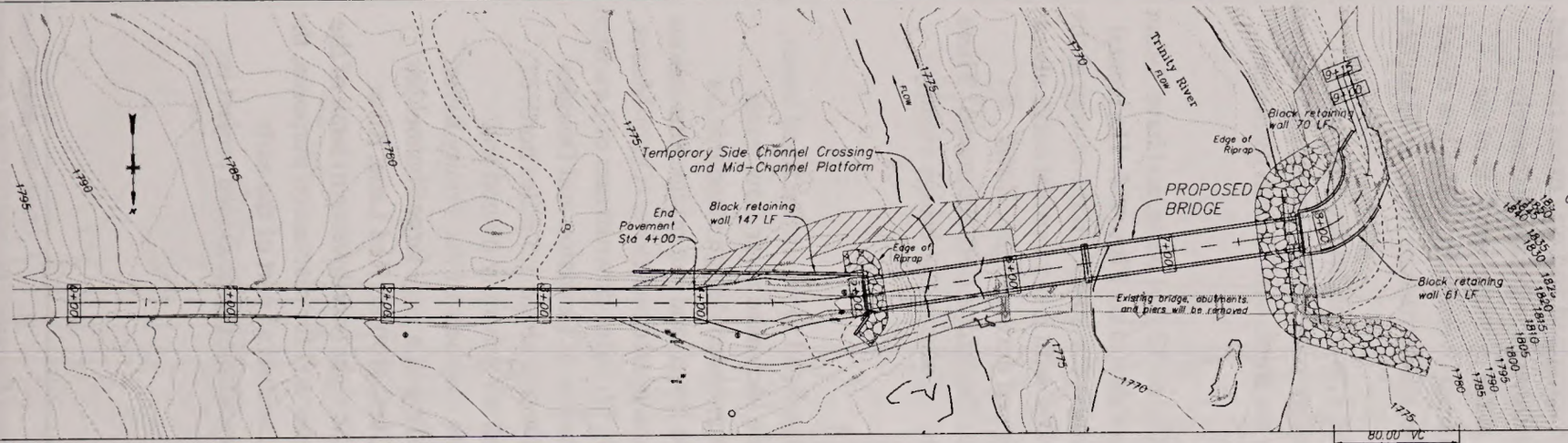
The gravel-surfaced left approach roadway is approximately 16 feet wide from its intersection with Goose Ranch Road and crosses the Trinity River floodplain. The left horizontal roadway alignment is tangent to the bridge. Vertical alignment is on a declining grade towards the bridge. The right approach roadway is also gravel surfaced and slopes upward across a cut slope leading away from the bridge. The right horizontal alignment has a sharp horizontal left curve immediately adjacent to the right bridge abutment. The existing horizontal and vertical alignments are shown on **Figure 3.** Salt Flat Road exists within an easement controlled by the Salt Flat Property Owners Association. The existing left approach grade is approximately 7.65 percent, and the existing grade on the right approach is approximately 15 percent.

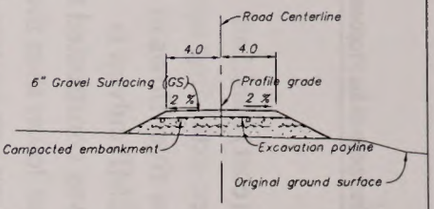
There are no overhead utilities near the bridge and there do not appear to be any underground utilities in the bridge vicinity. However, several private drinking water intakes are located within the ESL. One well is located approximately 100 feet upstream from the left roadway approach. A private service waterline follows the upstream edge of the road easement along the left approach. A second well exists approximately 65 feet downstream of the right abutment. Water lines extending from the well may lie beneath the existing road.

2.3.2 BUCKTAIL BRIDGE

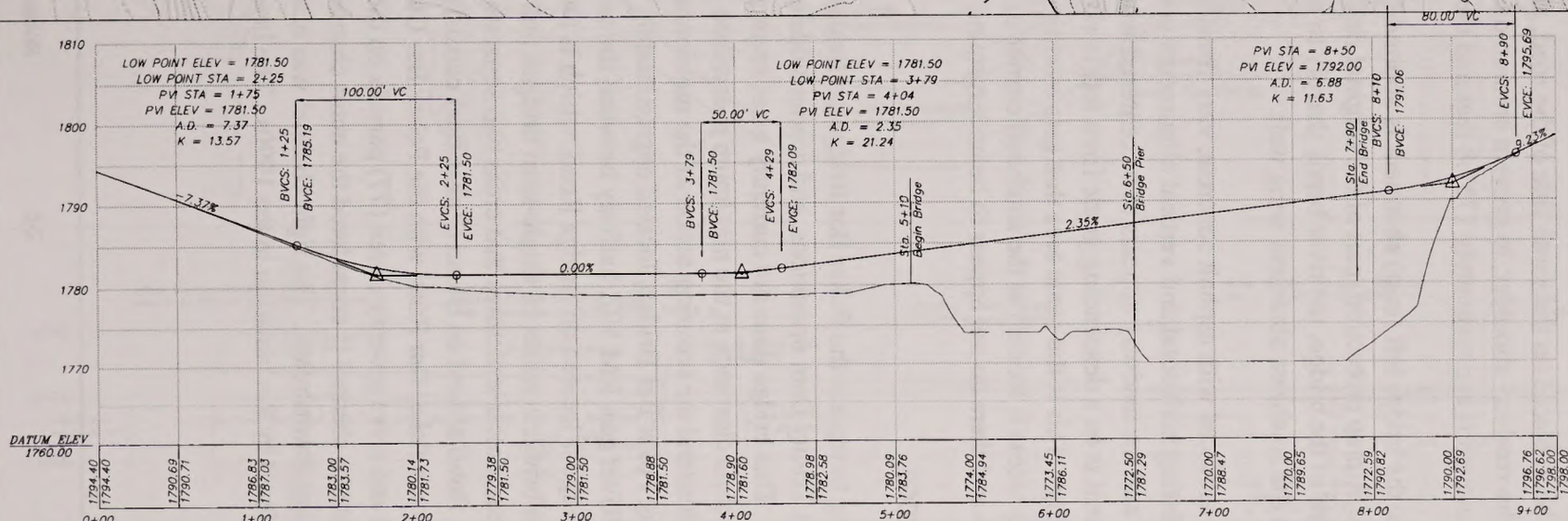
Reclamation is proposing to modify the roadway and drainage and approach features at the Bucktail Bridge site (Trinity County Bridge No. 5C-207) on Browns Mountain Road to minimize flood losses, allow more flexibility in Trinity Dam operations, and accommodate increased river flow levels prescribed by the ROD. The layout for the proposed project is illustrated in **Figure 4**. The existing flood accommodation capacity of the road-crossing culvert at this site does not appear adequate to pass prescribed flows and debris.

Bucktail Bridge is located about 5 miles west of Lewiston, California, where it spans the Trinity River near RM 105. The existing single-span bridge is a 76-foot-long, 32-foot-wide, steel girder superstructure with concrete deck and concrete abutments supported by steel "H" piles. Built in 1984, the bridge is owned and maintained by Trinity County and services approximately 60 parcels in the Bucktail subdivision as well as lands administered by BLM. Browns Mountain Road is used by local traffic, tourists, and recreationists and has an average daily traffic (ADT) of 170 vehicles per day (1998) at Bucktail Bridge.

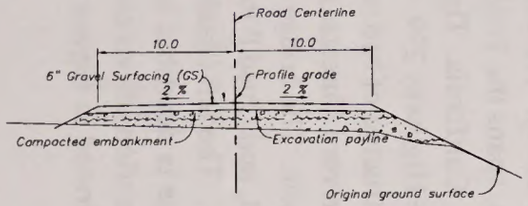

Temporory Side Channel Crossing and Mid-Channel Platform
End Pavement Sta 4+00
Block retaining wall 147 LF
Edge of Riprap
PROPOSED BRIDGE
Trinity River
FLOW
Block retaining wall 70 LF
Edge of Riprap
Block retaining wall 61 LF
Existing bridge, abutments and piers will be removed



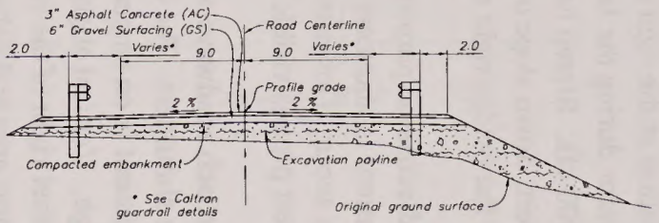
TYPICAL ROAD SECTION
STA 8+74.76 TO 9+15
NO SCALE



SALT FLAT BRIDGE PROFILE
(new bridge Min. El. 1784.00 ft)



TYPICAL ROAD SECTION: STA 0+00 TO 4+00
NO SCALE



TYPICAL ROAD SECTION: STA 4+00 TO 5+10 and STA 7+80 TO 8+74.76
NO SCALE

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TRINITY RIVER DIVISION
TRINITY RIVER MAINSTEM FISHERY RESTORATION

TRINITY RIVER BRIDGES
SALT FLAT BRIDGE
PROPOSED ACTION - DOWNSTREAM TRUSS
PLAN, PROFILE AND ROAD SECTIONS

DESIGNED ANNE MCDANIEL CHECKED Name
DRAWN ANNE MCDANIEL TECH. APPR. Name
PEER REVIEW WATER CONVEYANCE GROUP DENVER, COLORADO

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North State Resources, Inc.

Figure 3. Salt Flat Bridge
Existing/Proposed Action Comparison
Trinity River Bridges Project
March 3, 2003

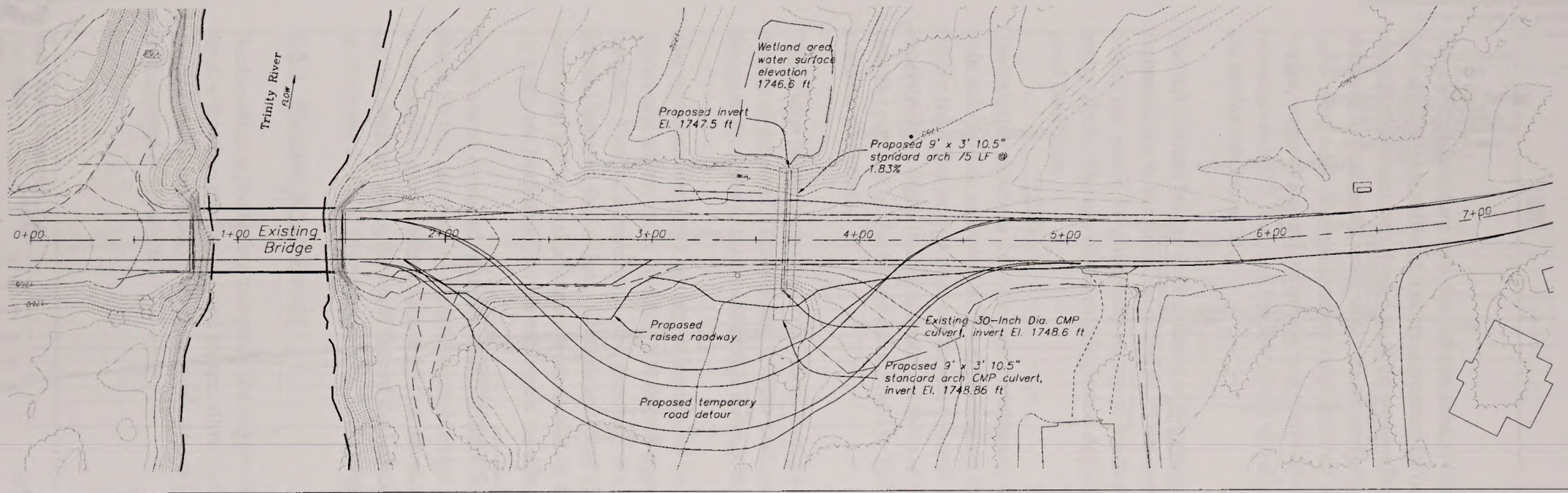
At the Bucktail Bridge site, the main channel of the Trinity River is near the left (east) bank; an overflow channel on the right (west) is separated from the main channel by a levee extending several hundred feet upstream of the bridge. A notch in the levee structure exists to allow river flows in excess of 6000 cfs to enter the overflow channel. An existing 30-inch diameter CMP culvert is located beneath the overflow section of the road. It is assumed that this culvert was constructed to pass minor excess flows. The road over the CMP culvert is approximately six feet lower than the elevation at the right end of the bridge. This area was reportedly overtopped and was under two-feet of water during the January 1, 1997 flood event, which has been estimated to be approximately 11,000 cfs. Riprap has been placed on the south side of the road, at the downstream side of the culvert, down slope of the roadway shoulder, to prevent erosion during overtopping. The low chord near the bridge right abutment is approximately 1757.8 feet and the superstructure depth is 53 inches.

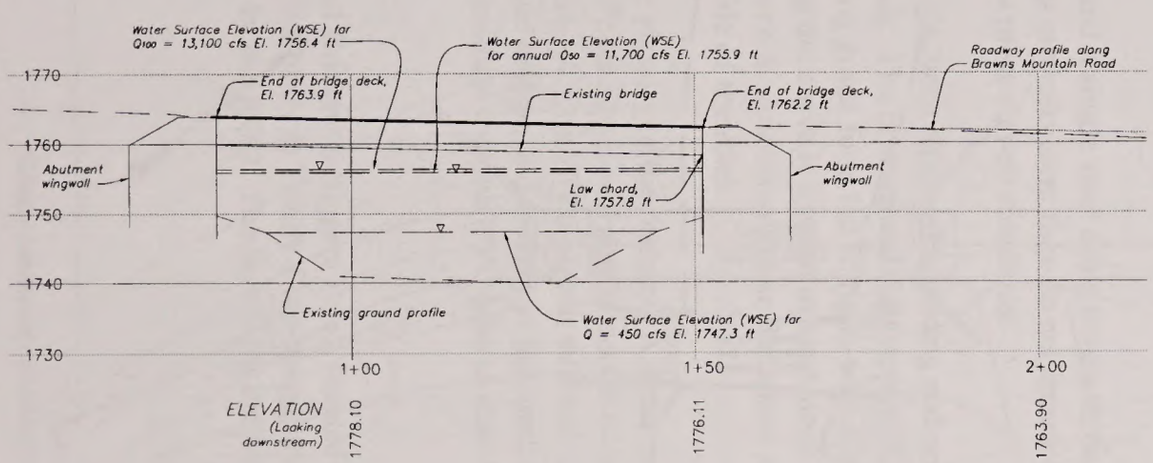
For discussion purposes, the bridge left (east) abutment is abutment 1, and the bridge right (west) abutment is abutment 2. Riprap protection, part of the original design, protects the existing abutments from scour. Downstream of the bridge, the river bends sharply to the right. An 18-inch diameter culvert pipe is visible at the southeast abutment wing wall.

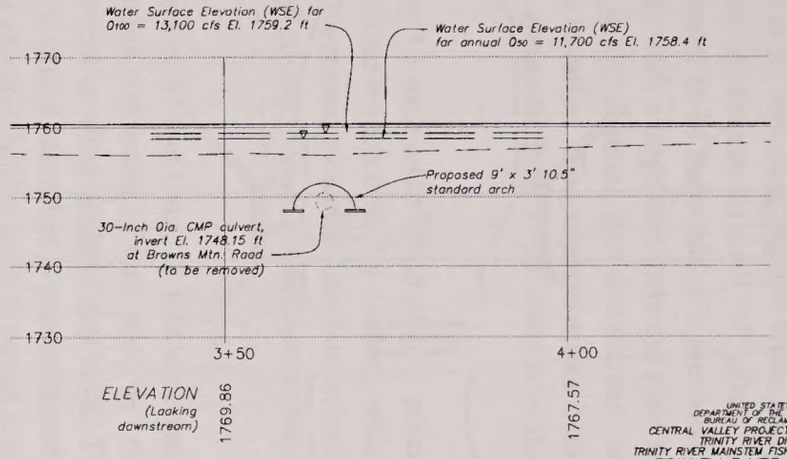
Approach roadways are surfaced with asphalt concrete, vary from 20 to 32 feet wide, and have 3-foot wide shoulders. The existing horizontal and vertical alignments are shown on **Figure 4.** Horizontal alignment is on tangent and the roadway appears to be centered within the 80-foot right-of-way at the bridge. Vertical alignment is on a descending grade from left to right with a sag vertical curve about 175 feet right of the bridge. This is the same area that gets overtopped during higher flows. A parking area and fishing access is located at the southeast corner of the bridge (left abutment). There are no overhead utilities and there do not appear to be underground utilities in the bridge vicinity.

2.3.3 POKER BAR BRIDGE

Reclamation is proposing to replace the Poker Bar Bridge on Bridge Road to minimize flood losses, allow more flexibility in Trinity Dam operations, and accommodate increased river flow levels prescribed by the ROD. This bridge does not currently meet recommended design standards for water conveyance and debris clearance at the maximum prescribed flows, and the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed flows (Omni-Means, LTD 2000). The existing Poker Bar Bridge, located approximately 10 miles downstream of Lewiston Dam, spans the Trinity River near RM 102, halfway between the towns of Lewiston and Douglas City, California. The bridge is located on Bridge Road, which is located about 1.5 miles north of State Highway 299. The bridge consists of single-span bridges that are privately owned and constructed of two railroad flatcar structures that cross two separate channels of the Trinity River. The river bifurcates and flows around an island (Poker Bar) consisting of a very large channel bar deposit. The bridge connect Poker Bar Road with the Poker Bar Campground, Red Lane, River Road, and Quad P Road and serve seventy-seven (77) parcels on the right (northwestern) bank of the river. The left (southeastern) channel is considered the main channel and for discussion purposes, the bridge is described looking downstream. The right channel was modified as part of the early restoration efforts completed by Reclamation in the 1990s. The layout for the proposed project is illustrated in **Figure 5.**






Water Surface Elevation (WSE) for Q100 = 13,100 cfs El. 1759.2 ft
Water Surface Elevation (WSE) for annual Q50 = 11,700 cfs El. 1758.4 ft
1770
1760
1750
1740
1730
Proposed 9' x 3' 10.5" standard arch
30-Inch Dia. CMP culvert, invert El. 1748.15 ft at Browns Mtn. Road (to be removed)
3+50
4+00
ELEVATION (Looking downstream)
1769.86
1767.57

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TRINITY RIVER MAINSTEM FISHERY RESTORATION

TRINITY RIVER BRIDGES

BUCKTAIL BRIDGE

PROPOSED ACTION – RAISED ROAD AND CMP ARCH
PLAN AND PROFILE

DESIGNED ANNE MCDANIEL CHECKED NAME
DRAWN ANNE MCDANIEL TECH. APPR. NAME
PEER REVIEW NAME

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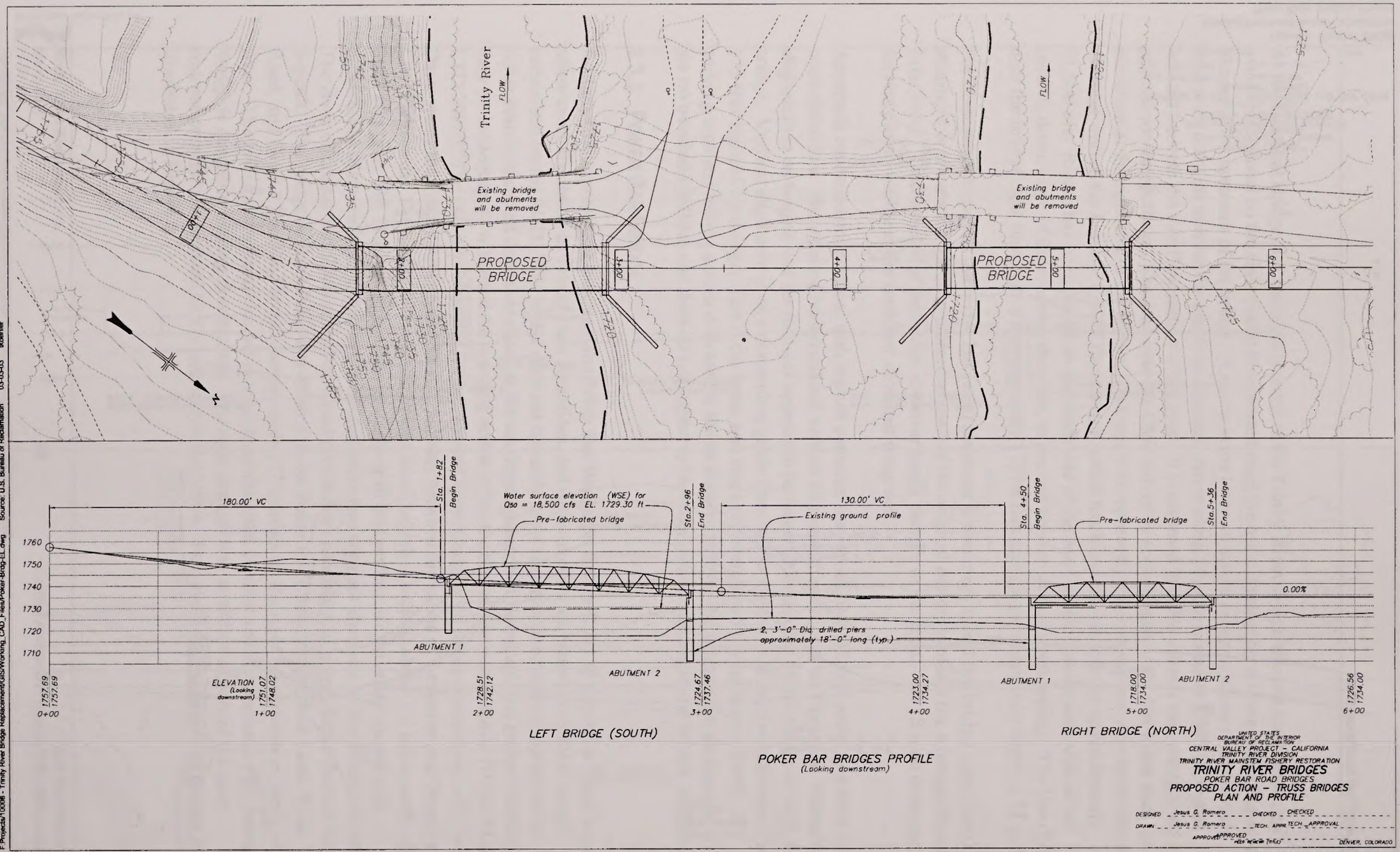
North State Resources, Inc

Figure 4. Bucktail Bridge
Existing/Proposed Action Comparison
Trinity River Bridges Project
March 3, 2003



POKER BAR BRIDGES PROFILE
(Looking downstream)

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TRINITY RIVER DIVISION
TRINITY RIVER MAINSTEM FISHERY RESTORATION
TRINITY RIVER BRIDGES
POKER BAR ROAD BRIDGES
PROPOSED ACTION – TRUSS BRIDGES
PLAN AND PROFILE

DESIGNED Jesus G. Romero CHECKED CHECKED
DRAWN Jesus G. Romero TECH. APPR. TECH APPROVAL
APPROVED APPROVED
(FOR REVIEW ONLY)
DENVER, COLORADO

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Figure 5. Poker Bar Bridges
Existing/Proposed Action Comparison
Trinity River Bridges Project
March 3, 2003

The existing structure over the left (southeast) channel is 52 feet long, 20 feet wide, and consists of twin side-by-side railroad flatcars supported by concrete abutments on steel "H" piles. The concrete abutments contain two riveted steel caissons, which appear to be remnants of a previous bridge structure. Abutment 2 wing walls are severely cracked, with a large tree growing right next to the north wing wall. The presence of large concrete slabs in the channel, just downstream of the existing bridge, suggests a previous bridge was removed at this location. The superstructure depth is approximately 2.5 feet, and the low chord elevation is approximately 1726.2 feet near the west end of the bridge (abutment 2).

The left channel bridge deck consists of 4-inch thick by 12-inch wide wood planks, placed perpendicular to the direction of traffic. Two rows of three 4-inch thick by 12-inch wide running boards are placed longitudinally on top of the deck. The running boards distribute wheel loads to the bridge deck. The age of the existing wood decking and running boards is unknown, but appear in good condition.

The existing structure over the right (northwest) channel is 87 feet long, 18 feet wide and consists of twin side-by-side railroad flatcars supported on abutments consisting of four steel "H" piles and a timber log. This bridge does not have a concrete abutment or wing walls of any kind. The superstructure depth is approximately 3 feet and the low chord elevation is approximately 1726.7 feet near the east end of the bridge (abutment 1). The right channel bridge deck is paved with asphalt concrete pavement.

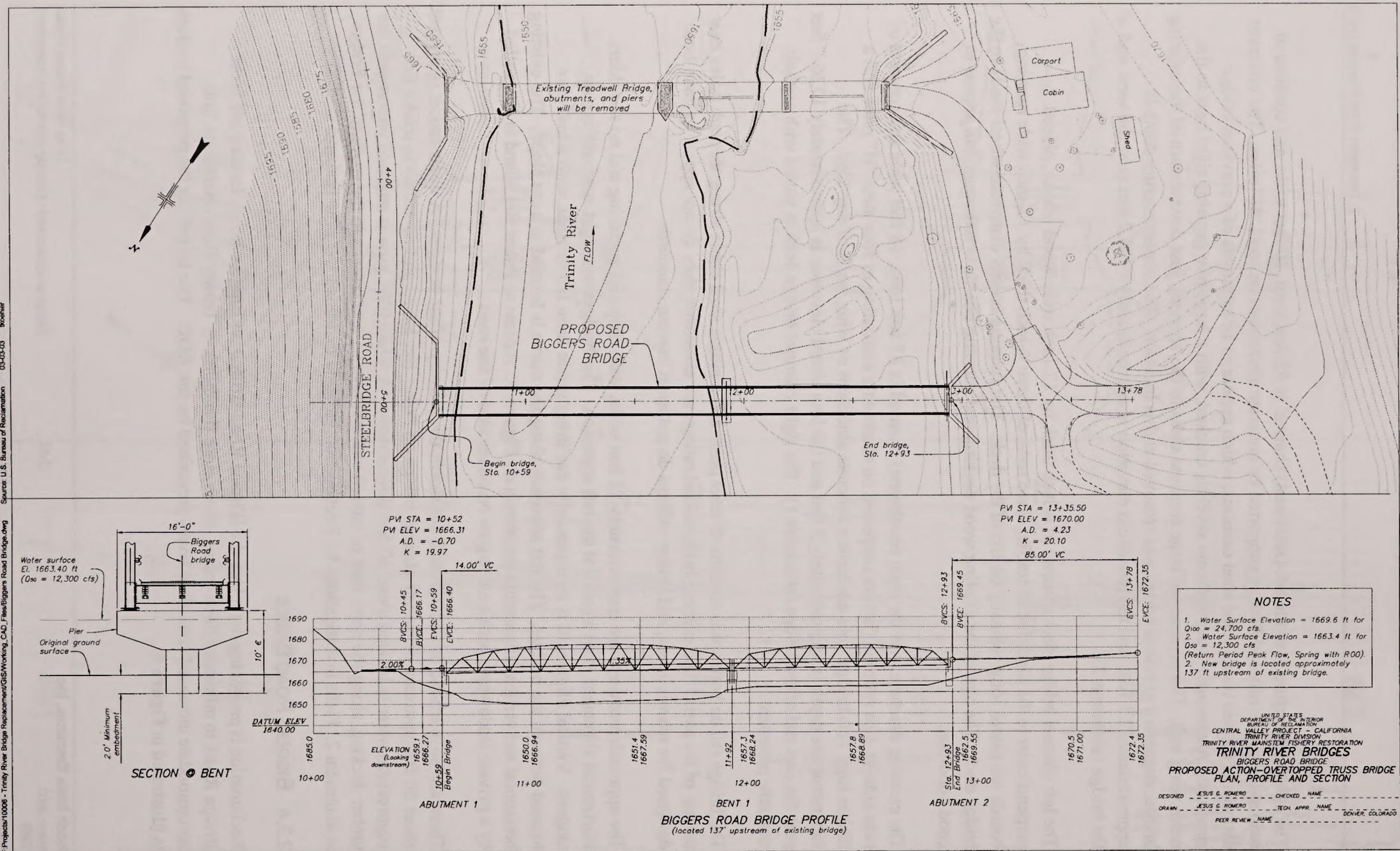
The bridge rail on both spans consists of steel posts and a single steel cable strung through holes near the top of the posts. The existing bridges load ratings are unknown; they do not appear to have been designed for seismic loads, and bridge railings do not meet current standards.

The approach roadways are approximately 18 feet wide, with chip seal surfacing and no shoulders. Horizontal alignment is on a curve at the left approach. The bridges and right approach are on tangent. Vertical alignment is on a generally declining grade form left to right, with a low area located between the bridges. The left approach along the curve is located in a cut slope. The existing horizontal and vertical alignments are shown on **Figure 5.** Access to Poker Bar island is controlled by a private landowner, with a cable gate on either side of the road.

There are no overhead or underground utilities in the vicinity of the bridges. A water faucet is present about 50 feet upstream of the left channel bridge on Poker Bar island and an access to intake fire suppression water is located about 50 feet downstream. A white PVC pipe is attached underneath the timber decking, along the north face of the left channel bridge, and crosses to the south of the bridge at abutment 2. Field investigations by Reclamation indicate that this PVC pipe is abandoned.

2.3.4 Biggers Road Bridge

Reclamation is proposing to replace the Biggers Road Bridge on Biggers Road, located off Steel Bridge Road, to minimize flood losses, allow more flexibility in Trinity Dam operations, and accommodate increased river flow levels prescribed by the ROD. The layout for the proposed project is illustrated in **Figure 6**.



NOTES

1. Water Surface Elevation = 1669.6 ft for Q100 = 24,700 cfs.
2. Water Surface Elevation = 1663.4 ft for Q50 = 12,300 cfs. (Return Period Peak Flow, Spring with R00).
2. New bridge is located approximately 137 ft upstream of existing bridge.

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TRINITY RIVER MAINSTEM FISHERY RESTORATION

TRINITY RIVER BRIDGES

BIGGERS ROAD BRIDGE
PROPOSED ACTION–OVERTOPPED TRUSS BRIDGE
PLAN, PROFILE AND SECTION

DESIGNED JESUS G. ROMERO CHECKED NAME
DRAWN JESUS G. ROMERO TECH. APPR. NAME
PEER REVIEW NAME
DENVER, COLORADO

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Figure 6. Biggers Road Bridge
Existing/Proposed Action Comparison
Trinity River Bridges Project
March 3, 2003

The existing bridge does not currently meet recommended design standards for water conveyance and debris clearance at the maximum prescribed flows, and the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed flows (Omni-Means, LTD 2000). A load test to determine the bridge's load rating was performed by Bridge Diagnostics, Inc., Boulder, Colorado. The results of the test indicate that portions of the bridge have low live load ratings, with span 2 experiencing the lowest rating. Even though the possibility of a vehicle traveling at a high rate of speed is not likely, the existing bridge rail is very weak and not capable of resisting any vehicle load or redirecting any type of vehicle.

Biggers Road Bridge is located off Steel Bridge Road, approximately 3 miles upstream (east) of Douglas City, at River Mile (RM) 97. The one-lane bridge is privately owned and serves 9 parcels on the right (west) bank of the river. The existing structure is a four-span, 204-foot-long, 12-foot-wide, railway flatcar bridge supported on concrete piers and abutments. For discussion purposes, the four spans are numbered 1 through 4, from left to right, looking downstream. Span lengths are 30 feet, 71.9 feet, 55.5 feet, and 46.5 feet, respectively. The abutment on the left is 'abutment 1,' and the abutment on the right is 'abutment 2.' From left to right, the piers are numbered 1 through 3.

The bridge deck consists of 4-inch thick by 12-inch wide wood planks, placed perpendicular to the direction of traffic. Two rows of three 4-inch thick by 12-inch wide running boards are placed longitudinally on top of the deck. The running boards distribute wheel loads to the bridge deck. The bridge rail consists of 4-inch square wood posts and railing. The age of the existing wood decking and bridge railing is not known, but the bridge decking, running boards and railing appear weathered.

Abutment 1 is gravel-surfaced and founded on bedrock. Gravel or fill encases portions of the superstructure near abutment 1. The piers are founded on schistose bedrock that is hard (rings when struck with a hammer) and massive in appearance. On the landside of piers 1 and 2, the concrete forms a tight bond with the rock foundation. On the waterside of piers 1 and 2, undercutting extends for the entire length of both piers. It is not clear whether the concrete or the rock foundation eroded.

The undercut area was probed and no reinforcement or anchor bolts were encountered. This indicates that the pier concrete may not be anchored to the bedrock. Sand with grass cover is found around pier 3, which is founded on and tightly bonded to bedrock. Abutment 2 is founded on bedrock and partly encased in gravel or fill.

To tie the bridge down to the piers, steel chains were wrapped around 1" diameter steel cables, which were cast into the top of the piers. The timber decking has weathered considerably and it is damaged to the point that approximately 30% of the bridge wood planks need to be replaced. The horizontal members of the bridge railing are missing along most of span 2.

The railroad flatcars that make up the bridge spans are distinctly different. The low chord elevation is 1661.4 feet and occurs along span 3. The deepest section is approximately 3 feet. The timber rail posts are approximately 3 feet high.

The age of the concrete piers and railroad flatcars is unknown. According to local residents, the railroad flatcar bridge was constructed in the early 1970's to replace an existing log-span bridge. It appears that the railroad flatcars were not new when they were installed, and were modified to fit the

existing piers and abutments. The railroad flatcar used for span 1 has a large notch cut into the bottom flange and web to make it fit abutment 1. Because the railroad flatcar for span 4 was not long enough, an additional piece was spliced onto the end near pier 3.

The approach roadways immediately adjacent to the bridge are gravel surfaced. The left approach is of varying width and intersects Steel Bridge Road approximately 25 feet east of abutment 1. The right (westerly) approach leading away from the bridge is 12 feet wide on a sharp horizontal right curve that provides access to the other parcels. A private residence is located approximately 60 feet west of abutment 2. The bridge horizontal and vertical alignments are shown in **Figure 6**.

There are no overhead utilities, and underground utilities are not apparent near the bridge. A shallow domestic water well and pump are located approximately 20 feet upstream of pier 3. A satellite dish is located approximately 220 feet north of abutment 2.

2.4 Proposed Action

The following paragraphs summarize the proposed action at each of the four sites proposed for bridge improvement/replacement activities. A detailed description of each proposed action is included as **Appendix A**.

Salt Flat Bridge and Biggers Road Bridge are scheduled to commence construction in Summer 2003 with completion of construction and demolition anticipated by Fall 2004. Bucktail Bridge is scheduled to commence construction Summer 2004 with completion of construction by Fall 2004. Poker Bar Bridge is scheduled to commence construction in Summer 2004 with completion of construction and demolition anticipated by Fall 2005.

2.4.1 Salt Flat

The proposed action bridge at Salt Flat will be constructed approximately 4 to 44 feet downstream (centerline to centerline) of the existing left and right bridge abutments, respectively. The new alignment will diverge approximately 8 degrees from the existing bridge alignment (**Figure 3**). Because the new left abutment will be constructed nearly at the location of the existing left abutment, the first flatcar span of the existing bridge will be "rotated" and modified to provide temporary construction access for the property owners. The bridge will be constructed on private property, and will be owned collectively by the Salt Flat Subdivision property owners. The bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 280 feet long (two 140 foot spans), with an 18-foot clear roadway width, designed to carry HS20 loading. New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The proposed action requires raising the left road approach approximately 4 feet to provide sufficient hydraulic freeboard over the river.

The increased span length will provide a wider flow area under the bridge, reducing the backwater surface elevations and water velocities. This will result in a more natural condition than the existing

constricted channel. The left abutment and single column bent supporting the superstructure will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor to minimize construction activity in the active low-flow channel for these components. Engineered abutment fill slopes and rip-rap will encroach beyond the river channel edge at the right abutment.

The single column bent will be constructed on the mid-channel bar above the active low-flow channel elevation. The contractor will be required to provide access to the mid channel bar by constructing a temporary crossing that provides a stable route for equipment and contractor personnel. The crossing will minimize impacts to beneficial uses, including aquatic organisms and domestic and agricultural water supplies. The temporary crossing will be constructed by placing and contouring spawning gravel in the channel to provide an adequate base for placement of steel landing mats (similar to temporary military runway matting). The mats will be placed flush to the channel bottom approximately 1-foot below the low-flow water surface elevation and will extend up the channel banks to an elevation providing approximately 3 feet of freeboard above the low-flow water surface elevation. The mats will remain in place until removed during the subsequent construction season. The bent will be a 3.5-foot diameter column anchored to bedrock in one 3.5-foot diameter drilled shaft. It will have a small "foot print," impacting the least amount of area, and will be relatively quick to install. It is estimated that a working platform with an area 35-foot wide by 55-foot long (+/- 1900 ft^2) will be needed for equipment setup, access for bent construction and crane operation. The working platform will be constructed using cut-and-fill methods with existing site materials and/or imported spawning-sized gravels. Dump trucks and earthmoving equipment may be used to construct the mid-channel bar platform. Bent construction will be accomplished using standard equipment and procedures based on types of equipment available. The reinforced concrete abutments and wingwalls will be founded on drilled shafts anchored in bedrock.

The contractor will utilize the mid-channel bar platform for bent construction and for positioning a crane to lift the bridge superstructure in place. It is anticipated the superstructure will be installed during the fall season after the in-river construction period has ended. Side channel crossing to access the platform will be kept to a minimum and is anticipated to occur roughly 10 to 20 times for each construction component (i.e., bent and superstructure installation). Vehicles crossing the side channel may include: earthmoving equipment, crane(s) and trucks. The contractor will be required to clean vehicles prior to crossing the side channel. Staging areas for construction will be located immediately upstream or downstream of the existing left abutment or may be located upstream on the Bonk parcel approximately 200 feet upslope from the left abutment (**Figure 3**).

All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. Make-up water pumped from the river will pass through a screen at the inlet with maximum ¼-inch openings and a maximum intake velocity of 0.8 feet-per-second. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts. Slope protection measures will be implemented at abutments and constructed slopes to provide erosion protection from high flows.

Demolition and removal of piers 2 and 3 may require installation of in-channel access ramps extending from the right and left banks to the piers, depending on contractor methods. Any in-channel ramps/crossings will be constructed upstream of the existing bridge and will cross the side channel and extend from the left and right banks to a point at or near piers 2 and 3. The ramps will be

constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation.

Demobilization procedures will include clean up of all construction debris, fine-grading and contouring to "blend" new grades to existing grades and revegetation where required by final design and/or permits.

Construction is anticipated to begin in the Summer 2003 with installation of access routes, temporary crossing of side-channel, staging areas, mid-channel bar work platform, right abutment engineered fill-slopes and modification of existing bridge alignment. Subsequent construction of the left abutment, bent structure, bridge superstructure, bridge decking, approach roadways, partial fine-grading and associated revegetation will occur prior to the following Winter. Finally, removal of the existing bridge and foundations, construction of remaining areas of fine-grading and associated revegetation will occur during the following Summer/Fall. Total construction time (not including demolition in subsequent construction season) is anticipated to be approximately 200 days. In-water work for each element of this project is anticipated as follows: 10 days on the right abutment (5 in 2003 and 5 in 2004), 7 days on the side channel crossing installation and removal (5 in 2003, 2 in 2004). Demolition and clean up is projected to require about 50 days (including approximately 14 days of in-water pier removal).

2.4.2 BUCKTAIL

The Proposed Action for the Bucktail Bridge consists of raising the west approach roadway and replacing the existing 30-inch diameter culvert, approximately 215 feet right (west) of the existing bridge, with a 9-foot wide by 4-foot high arch structure (**Figure 4**). The arch culvert design will include a natural "bottom" and will increase the conveyance of flows under the Browns Mountain Road embankment. The design also includes raising the Browns Mountain roadway profile approximately 4.5 feet to an elevation of 1760.5 MSL. The arch structure will have the capacity to convey approximately 80 cfs (existing culvert capacity is approximately 10 cfs). The existing roadway is overtopped during high flow events. The roadway profile will be raised and improved so that the road is not overtopped during high flows. The new roadway embankment and culvert will exhibit hydraulic characteristics similar to the existing system but will be overtopped only during extreme high-flow events greater than the 100-year event. The new culvert structure will be long enough so that the Browns Mountain Road width will remain 32-feet wide with 2:1 side slopes, and will include guardrails. The existing bridge will provide about 1.2 feet of freeboard for Q_{100} (13,100 cfs) at the low chord, which is on the bridge right abutment. The freeboard will be higher at the left abutment. For a flow of 15,000 cfs, the water surface elevation is approximately 0.4 feet below the low chord. Slope protection will be provided on both sides of the right approach roadway to protect the embankment from erosion.

The process for arch culvert installation requires: excavation and removal of the existing culvert; excavation of dewatering trenches outside of culvert footing zone(s) (potentially, depending on seasonal groundwater variation); preparation of culvert "bottom" streambed and installation of footings and culvert panels and reconstruction of the roadway embankment.

The Proposed Action does not require any work within the active low-flow channel (Q = 450 cfs). A detour will be constructed around the existing road and culvert located to the west of the existing bridge and outside of the active low-flow channel. It is estimated that the detour will be in operation for a period of about 8 to 10 weeks. The detour will be built within the active flood plain, north of the existing road. To construct the detour, the contractor may use an excavator, a dozer or other equipment as needed. The existing bridge will remain in place and open to traffic at all times during construction, and will be used to provide access for homeowners and construction equipment and personnel. Keeping the existing bridge open will minimize impacts to the homeowners. Traffic control will be the provided by the contractor and it is the contractor's responsibility to provide access for the homeowners. Temporary closures of Browns Mountain Road and Bucktail Bridge may be needed at certain times during construction and near the completion of the work, when tying the new road alignment onto the existing road alignment.

The staging area for construction will be located upstream of the bridge on the left side of the river (**Figure 4**). Construction is anticipated to occur in one Summer/Fall season. Total construction time is anticipated to be approximately 90 days (including removal of the existing culvert).

2.4.3 POKER BAR

The proposed action would construct two bridges approximately 35 feet upstream of the existing bridges at Poker Bar (**Figure 5**). The bridges will remain on private property, and will be the property of the Poker Bar Property Owners Association. The proposed bridge types are single span prefabricated steel trusses with reinforced concrete deck, with an 18-foot clear roadway width, designed to carry HS20 live loading. The proposed bridges are 110 feet long over the left channel, and 80 feet long over the right channel. The prefabricated steel truss heights are 9 feet and 7.5 feet respectively. The bridge superstructure and guardrail will be fabricated with weathering steel. Weathering steel is high strength steel that develops a coating that protects it from corrosion and does not require painting or maintenance. The portion of road between the two bridges and the approaches will have an 18-foot clear roadway width, and it will be paved with asphalt concrete.

The longer spans will provide for a wider flow area under the bridges that will reduce the backwater elevation, and water velocities. The proposed bridge abutments are located outside of the low-flow active channel (Q = 450 feet^3/sec). This will allow the contractor the ability to access and install supports without encroaching upon the low-flow active channel.

Under the proposed action, the Poker Bar bridge abutments will be founded on drilled shafts. Drilled shafts construction will be done using standard equipment and procedures (Contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutment wing walls will be reinforced earth with brick facade.

All material and water required for drilling and installing the drilled shafts will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since

equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. The left approach roadway will be raised approximately 10 feet and will have 2:1 side slopes. Slope protection will also be provided on both sides of the right approach roadway to protect the roadway embankment from flows that may overtop and may erode the road.

The road between the two bridges will be raised to elevation 1740.0 feet at the left bridge abutment 2 and transition to elevation 1734.0 feet at the right bridge abutment 1. Slope protection will also be provided on both sides of the road between the two bridges to protect the roadway embankment from high river flows that may overtop and may tend to wash away the road embankment.

The existing bridges will remain open to traffic and will provide access for homeowners and construction equipment and personnel during construction. Keeping the existing bridge open will minimize impacts to the homeowners. Traffic control will be the provided by the contractor and it is the contractor's responsibility to provide access for the homeowners. Temporary closures of Poker Bar Road, Bridge Road, and the existing bridges may be necessary at times during construction, particularly near the completion of the work (i.e., when tying the new road alignment onto the existing road alignment). Demolition of the existing bridges and associated fine grading and revegetation will occur after the new bridges and roadway alignment are complete.

Staging areas for construction will be located upstream and downstream of the island roadway alignment and upstream of the right channel right abutment (**Figure 5**). Construction of the bridge abutments, superstructures and decking is anticipated to occur in the summer season. Construction of new roadway alignment may extend into the fall. Demolition of existing structures will occur the following summer. Total construction time is anticipated to be approximately 200 days. An additional 40 days (approximately 30 days of in-water, and adjacent bank work, will be required to remove abutments) is anticipated to be required for removal of the old bridge, clean up, fine grading, and revegetation of the site, and would be accomplished after the new bridge is open to traffic in the second season of work.

2.4.4 Biggers Road Bridge

The proposed Biggers Road Bridge will be constructed approximately 137 feet upstream of and parallel to the existing bridge. The bridge will remain on private property and will be owned collectively by homeowners of the "Treadwell Subdivision" (**Figure 6**).

The proposed bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 230 feet long (one 140-foot span and one 90-foot span), with a 10-foot clear roadway width, designed to carry HS20 loading (see Design Criteria). New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The pre-project Steel Bridge Road profile or vertical alignment begins to overtop when flows reach Q = 15,000 cubic-feet-per-second (cfs). The existing Steel Bridge Road profile

will remain unchanged except for the area in the immediate proximity of the bridge left approach intersection.

The proposed bridge will be designed for overtopping on the left (east) side, near the intersection of the bridge and Steel Bridge Road. Though a small portion of the bridge is subject to overtopping, the Proposed Action avoids construction of roadway improvements, including several hundred feet of retaining wall adjacent to Steel Bridge Road. Retaining wall construction would result in significant removal of, and damage to, riparian areas adjacent to Steel Bridge Road and the bank of the Trinity River. A turnout area will be provided near the south end of the left abutment, parallel to Steel Bridge Road, to allow vehicles to enter and exit Steel Bridge Road more safely.

The two-span structure will provide adequate flow area under the bridge, reducing backwater effects and velocities for lower flows. The proposed abutments and single column bent will support the bridge superstructure. The bent will be located outside of the active low-flow channel (Q = 450 cfs) of the Trinity River.

The bent will be a single 3.5-foot by 7-foot column supported by a reinforced concrete footing, anchored to bedrock with drilled steel bar anchors. The bent has a small "foot print," impacts the least amount of area, and is relatively quick to install. It is estimated that a single working platform with an area 24-foot wide by 40-foot long (960 ft^2) will be needed for equipment setup and access for bent construction. Dump trucks may be used to transport material for construction of platform. Bent construction will be done using standard equipment and procedures (contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutments and wing walls will be reinforced concrete and/or reinforced earth structures.

All material and water required for drilling and installation of the steel bar anchors at the bent will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. The right approach roadway will be raised approximately 3 feet, and will have 2:1 side slopes. Slope protection will also be provided on both sides of the left approach roadway to protect the roadway embankment from flows that may overtop and may erode the road.

Demolition and removal of the old bridge pier may require installation of an in-channel access ramp extending from the right bank to the pier. The in-channel ramp/crossing will be constructed on the existing bridge alignment. The ramp will be constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation. Landing mats may be utilized on the ramp surfaces if necessary to support the equipment used. After demolition, the ramp gravel will be distributed/contoured over the adjacent channel bottom.

Staging areas for construction will be located between the Steel Bridge Road centerline and the active low-flow channel downstream of the left abutment and upstream of the right abutment on the Biggers parcel (**Figure 6**). Construction of the bridge abutments, bent, superstructure, decking and roadway approaches is anticipated to occur in the Summer/Fall seasons. Demolition of the existing bridge will

occur the following summer. Total construction time is anticipated to be approximately 200 days. Demolition and removal of the old bridge will require an additional 50 days (including 20 days of in-water work to remove pier and left bank abutment).

Section 3

Conservation Measures

This section provides a detailed summary of the conservation measures that will be implemented by Reclamation, BLM, and the County during implementation of the Trinity River Bridges Project. Conservation measures that are common to all four bridge sites are initially provided, followed by site-specific conservation measures presented by bridge site.

3.1 Measures Common to All Four Bridge Sites

3.1.1 Erosion and Sedimentation

Type D erosion control measures (e.g., hydroseeding) shall be implemented on impacted non-riparian upland areas, and on approach embankments where riparian trees and shrubs cannot be replanted.

Erosion control work shall consist of one application of erosion control materials within non-riparian upland areas and approach fills, embankment slopes, excavation slopes, and other areas designated by the project Engineer. These materials shall consist of fiber, native grass and forb seed, commercial fertilizer, and water.

Additional erosion control measures that shall be implemented by Reclamation's contractor include:

- Any construction activities proposed between the ordinary high water line (bankfull channel) and the low-flow channel water surface of the Trinity River, excluding passive vegetation removal activities above ground level (no soil disturbance), shall be restricted to the dry season (typically June 15th – September 15th), at all sites except Salt Flat and Bigger's Road, where work within the bankfull-to-water surface zone will be required outside this period when river flows are less than bankfull flows, at least during the first year of construction to meet the schedules identified in this BA/EFH assessment.
- Activities that increase the erosion potential within the project ESL and action area shall be restricted to the fullest extent possible to the relatively dry summer and early fall period to minimize the potential for rainfall events to mobilize and transport sediment to the Trinity River. If these activities must take place during the late fall, winter, or spring, then temporary erosion and sediment control structures must be in place and operational at the end of each construction day and maintained until disturbed ground surfaces have been successfully revegetated.
- Areas where wetland and upland vegetation need to be removed shall be identified in advance of ground disturbance and limited to only those areas that have been approved by Reclamation.
- Type D erosion control (e.g., hydroseeding) shall be applied to areas where vegetation has been removed to reduce short-term erosion prior to the start of the rainy season. Soils shall not be left exposed during the rainy season.

- Filter fences and catch basins shall be placed below all construction activities near the edge of the Trinity River, but not in contact with flowing water, to intercept sediment before it reaches the waterway. These structures shall be installed prior to any clearing or grading activities.

- Spoil sites shall be located such that they do not drain directly into surface water features, if possible. If a spoil site drains into a surface water feature, catch basins shall be constructed to intercept sediment before it reaches the feature. Catch basins will be sized appropriately to allow percolation of effluent through the bottom and the sides rather than overflow. Spoil sites shall be graded and vegetated to reduce the potential for erosion.

- Sediment control measures shall be in place prior to the onset of the rainy season and will be monitored and maintained in good working condition until the disturbed areas have been revegetated.

- Appropriate monitoring measures shall be implemented by Reclamation, BLM, and the County to document compliance with the measures described above. Monitoring measures would include turbidity measurements below the work sites, inspection of catch basins and filter fences, and monitoring of revegetation progress.

3.1.2 Accidental Spills

Construction specifications shall include the following measures to reduce potential impacts associated with accidental spills of pollutants (i.e., fuel, oil, grease, etc.) to vegetation and aquatic habitat resources within the project ESL:

- Equipment and materials shall be stored away from wetland and surface water features.

- Vehicles and equipment used during construction shall receive proper and timely maintenance to reduce the potential for mechanical breakdowns leading to a spill of materials. Maintenance and fueling shall be conducted in an area at least 150 feet away from the Trinity River.

- Spill containment booms will be maintained onsite at all times during construction operations and/or staging of equipment or fueling supplies. Fueling trucks will maintain a spill containment boom at all times.

- The contractor will develop and implement site-specific best management practices, a water pollution control plan, and emergency spill controls, and will be responsible for containment and removal of any toxins released.

3.1.3 Loss of Shaded Riverine Aquatic (SRA) Habitat

Riparian wetland vegetation directly adjacent to a river or stream is referred to as shaded riverine aquatic (SRA) habitat and is included as a component of designated critical habitat for SONCC ESU coho salmon, as well as a component of EFH for coho and chinook salmon. Riparian vegetation and SRA are not considered to be limiting in the Trinity River. In fact, remediation of channel confinement, due to the excessive encroachment of riparian vegetation promoted by the altered flow regime resulting from operation of the TRD, is one principal objective of the instream flows, sediment management, and bank rehabilitation projects recommended by the TRFE and scheduled for implementation under the ROD (USFWS and HVT 1999).

To maintain SRA habitat and bank stability adjacent to the bridge abutments, the projects would be designed to avoid and minimize losses of riparian vegetation adjacent to the Trinity River channel. Exclusionary fencing shall be installed along the boundaries of all riparian areas where construction access would have to occur to ensure that impacts to riparian vegetation are minimized. When loss of riparian vegetation within the project ESL is unavoidable, Reclamation shall implement the following measures:

- Prior to construction, a qualified biologist shall count and identify riparian tree and shrub species that would be removed to accommodate construction of the new bridge and roadway approaches.
- To mitigate for the loss of riparian habitat, the project would be designed to avoid and minimize losses to SRA features within the project construction zone to the fullest extent possible. When a loss of riparian vegetation is unavoidable, Reclamation will replant at a ratio of 3:1 (per woody riparian plant) to replace plants lost due to project construction activities. The 3:1 replanting ratio has been determined to be adequate to ensure successful establishment of at least one vigorous plant for replacement mitigation. Replacement of permanently lost riparian habitat would occur within the area previously occupied by the old bridge, which will be removed as part of the project, as well as open areas upstream and downstream of the new bridge and adjacent to the Trinity River. For temporary impacts, a mitigation ratio of 3:1 (per woody riparian plant) will also be used. Revegetation to address temporary impacts shall occur within the construction access areas upon completion of the project.
- Reclamation shall develop and implement a revegetation plan for impacts to riparian wetland that occur during project construction. The revegetation plan should identify appropriate mitigation for impacts, describe planting techniques and locations, and incorporate plantings of native species that would resist invasion of noxious plant species. A draft revegetation plan is included as **Appendix B**.
- Following the completion of construction activities, plantings shall be established to replace all riparian trees and shrubs that would be removed during project work. All non-native species that are removed will be replaced with native species. Replacement trees and shrubs should be planted in the appropriate season (i.e., spring or fall) following the completion of construction. Propagules (i.e., shrub cuttings, tree seedlings) shall be obtained either onsite or from a local nursery and planted along the Trinity River within the immediate project ESL. Reclamation shall monitor the plantings annually for up to three years to ensure that trees and shrubs have become established. Supplemental planting would be conducted, as necessary, to ensure that this performance standard is met. Once riparian mitigation has been successfully completed, Reclamation shall submit a memorandum to the ACOE and NMFS documenting the results.

3.1.4 WATER SUPPLY AND SOURCES

Water sources required for construction and post-construction activities shall be developed with regard to impacts on listed species and habitat. Withdrawals of water for construction and equipment uses shall be done using screened ($\leq$ ¼-inch openings) pump intakes and a maximum intake velocity of 0.8 feet-per-second. Where possible pump intakes shall be placed in swift water areas, such as riffles, to take advantage of high water velocities to rapidly bypass small fish past the suction intake. As an alternative, and where practicable, a "seep well" will be installed outside the active low flow channel to obtain fish-free "make-up" water for construction purposes (see **Appendix A**).

3.1.5 Impaired Fish Passage

To minimize effects on upstream and downstream migrant salmonids, the timing of in-water construction activities within the typical low-flow channel shall be limited to June 15th – September 15th, or later if permitted by CDFG and NMFS (dependent upon weather conditions). An initial extension to this in-water construction period is requested for the Salt Flat site, where in-water work will be required through October 15th during the first year of construction to meet the schedules proposed in this BA/EFH assessment and detailed in **Appendix A**. In-water construction and demolition will be restricted to the June 15th to September 15th period during all subsequent years' work.

3.1.6 Mortality of Rearing/Staging Salmonids During Construction

Timing of construction activities within the active low flow channel of the Trinity River shall be limited to June 15th – September 15th, or later if permitted by CDFG and NMFS (dependent upon weather conditions), to avoid, or minimize, impacts to rearing juvenile and staging adult salmonids. An initial extension to this in-water construction period is requested for the Salt Flat site, where in-water work will be required through October 15th during the first year of construction to meet the schedules proposed in this Biological Assessment and detailed in **Appendix A**. In-water construction and demolition will be restricted to the June 15th to September 15th period during all subsequent years' work.

3.1.7 Disturbance to Coho and Chinook Salmon Essential Fish Habitat

Disturbance of large woody debris (LWD) shall be avoided when possible. Necessarily removed LWD from the construction area would be stockpiled at the construction site for replacement in the Trinity River at an appropriate location within the site as determined by a fishery biologist.

Slope protection for road approaches and bridge abutments that may contact ordinary high water and flood waters of the Trinity River shall be composed only of appropriately sized, clean, shot quarried rock or boulder material.

Fill gravels used on the streambeds and stream banks will be composed of washed, spawning-sized gravels from a local Trinity basin source. Gravel will be washed to remove any silts, sand, clay, and organic matter and will be free of contaminates such as petroleum products. Washed gravel will pass the California Department of Transportation cleanliness test #227 with a value of 85 or greater.

The conservation measures proposed above for other project-related impacts to salmonids are adequate for addressing most other potential impacts to EFH for coho and chinook salmon. Additional site-specific conservation measures that avoid or minimize impacts to EFH are described for each project site in the next section.

3.1.8 Cumulative Effects

No additional mitigation is required beyond what is listed above for the proposed project.

3.2 Measures Unique to Bridge Sites

3.2.1 Salt Flat

In addition to the protective measures common to all four bridge sites and the measures incorporated into the project description for the Salt Flat Bridge Proposed Action, the following conservation measures will be incorporated into the project to minimize potential effects on anadromous fish species and essential fish habitat. This section describes additional conservation measures for the anticipated temporary and permanent effects from construction of the proposed action at Salt Flat.

Impaired Fish Passage

Use of gravel fill in the left side-channel to form a temporary, stable, wet crossing shall be placed to maintain a water depth of no less than approximately 1-foot at the crossing to minimize impacts to fish movement. This depth is typical of shallow riffles in the side channel at river flows of Q = 450 cfs. Placement of steel landing mat for the temporary crossing shall be made so that the mat is flush to the streambed, or flush to any necessary fill placed on the streambed. The contractor shall perform daily inspection of the temporary side-channel crossing. Debris accumulations on the steel mat will be removed when observed.

Use of gravel to form temporary, stable work platforms for removal of the old bridge piers in the main river channel shall be placed to extend across no greater than one-third the wetted channel width to minimize effects on fish migration. This will necessitate removing one pier at a time. Each gravel platform will be spread and graded to match existing riverbed contours as demolition work is completed. Work platforms will be constructed and used only during the June 15th to September 15th period. It is anticipated that each of these work platforms will be in place for up to 7 days.

Mortality of Rearing Salmonids During Construction

To avoid or minimize potential injury and mortality of fish during excavation and placement of fill or rip-rap materials within the active low flow channel, equipment shall be operated slowly and deliberately to alert and scare adult and juvenile salmonids away from the work area. The contractor shall be instructed that before submerging an excavator bucket or laying gravel or rip-rap below the water surface, the excavator bucket will be operated to "tap" the surface of the water, or a person will wade ahead of fill placement equipment to scare fish away from the work area.

Disturbance to Coho and Chinook Salmon Essential Fish Habitat

The moderate depth run and pool habitat within the active low flow channel adjacent to the right bank abutment of the new bridge will be encroached by placement of rip-rap revetment. The depth to which rip-rap is placed at this site shall be minimized to the extent possible within design safety constraints. Rip-rap shall be composed only of appropriately sized, clean, shot rock or boulder material. Any of this rip-rap above the active low-flow channel and exposed to full sunlight will be inter-planted with local riparian vegetation.

The temporary side-channel crossing shall be located to minimize channel changes and the amount of excavation or fill needed for construction. Fill shall be formed from washed, spawning-sized gravel, between ⅜- and 4-inches in diameter (Pollock 1969; Bell 1986). When use of this temporary crossing

is completed, any fill shall be spread and contoured to match the original side-channel streambed and banks.

Fill material used to construct the working platforms for removal of the existing bridge's mid-channel piers shall be formed from washed, spawning-sized gravel, between ⅜- and 4-inches in diameter. This material will be graded to match natural streambed and bank contours at the site after completion of work. It is anticipated that each of these work platforms will be in place for up to 7 days.

3.2.2 BUCKTAIL

No additional protective measures beyond those considered common to all sites, and the measures incorporated into the project description for the Bucktail Bridge Proposed Action, are anticipated to address temporary and permanent effects from construction of the proposed action at the Bucktail site.

3.2.3 POKER BAR

No additional protective measures beyond those considered common to all sites, and the measures incorporated into the project description for the Poker Bar Bridges Proposed Action, are anticipated to address temporary and permanent effects from construction of the proposed action at the Poker Bar bridges.

3.2.4 BIGGERS ROAD BRIDGE

In addition to the protective measures common to all four bridge sites and the measures incorporated into the project description for the Biggers Road Bridge Proposed Action, the following conservation measure will be incorporated into the project to minimize potential effects on anadromous fish species and essential fish habitat. This section describes additional conservation measures for the anticipated temporary and permanent effects from construction of the proposed action at Biggers Road Bridge.

Disturbance to Coho and Chinook Salmon Essential Fish Habitat

Fill material used to construct the working platforms for installation of the single bent, and for removal of the existing bridge's mid-channel pier shall be formed from washed, spawning-sized gravel, between ⅜- and 4-inches in diameter. This material would be graded to match natural streambed and bank contours at the site after completion of work. It is anticipated that the work platform to access the mid-channel pier will be in place for up to 5 days.

Section 4

Action Area

4.1 Regional Setting

The Trinity River Basin is comprised of the majority of Trinity County and the easternmost portion of Humboldt County. The terrain is predominantly mountainous and forested, with little available farming area. Two scenic byways cross the County: Highway 299 and State Route 3. Lakes and rivers provide opportunities for fishing and boating. Most of the Hoopa Valley Indian Reservation is within the basin. The largest town in the region is Weaverville, followed by Hoopa, Hayfork, and Lewiston. Land use within the Trinity River Basin is greatly influenced by the large amount of public, Indian, and private forestlands, much of which managed for timber production and other natural resources. Private uses along the Trinity River are generally limited to scattered residential and commercial development. State Highway 299 is the primary travel corridor through Trinity County, connecting the Central Valley with the coastal communities of Humboldt County.

With a population totaling approximately 15,000, the Trinity River Basin is very lightly populated. . Throughout the watershed, residential, commercial, and industrial uses tend to be concentrated on relatively flat areas near the Trinity River or its tributaries, as typified by the population centers of Weaverville, Hayfork, Lewiston, Willow Creek, and Hoopa. Together, these communities house two-thirds of the basin's population.

The development potential of most of the land in the watershed is restricted by topography, public ownership, Timber Production Zone zoning (which applies to most private land), and by Trinity County (County) and tribal planning policies that guide development towards already developed areas and discourage development on resource lands. Small communities like Douglas City and Junction City exist along State Highway 299 on level terrain adjacent to the Trinity River. This development has been primarily residential in nature, typified by scattered single-family residences and mobile homes. Much of this residential development has encroached on the floodplain of the river and its tributaries.

4.2 Regional Hydrology

The Trinity River drains a basin of 2,965 square miles, approximately one-quarter of which is above Lewiston Dam. The terrain is predominantly mountainous and forested, with little available farming area. The Mediterranean climate is characterized by an average precipitation of 62 inches per year; throughout the basin it varies from 30-70 inches and typically occurs as rain in the lower elevations and snow at the higher elevations.

The Trinity River is the largest tributary to the Klamath River. It consists primarily of the mainstem, the North and South Forks, and the New River. The mainstem originates in the rugged Salmon-Trinity Mountains of northwest California, at a point approximately 10 miles southwest of the town

of Weed, California. Elevations range from 8,888 feet above mean sea level (MSL) at Sawtooth Mountain in the Trinity Alps to 300 MSL at the confluence of the Trinity and Klamath Rivers. The mainstem Trinity River flows a total of 170 miles from its headwaters to its confluence with Klamath River at Weitchpec, and the Klamath River flows northwesterly from its confluence with the Trinity River for approximately 40 miles before entering the Pacific Ocean. In general, the proposed project focuses on the 10 miles of Trinity River mainstem between the Salt Flat Bridge, near the community of Lewiston, and the Biggers Road Bridge, upstream of Douglas City.

The Trinity River Division (TRD) was authorized in 1955 and began operating in 1964. The TRD consists of a series of dams, tunnels, and power plants that export water from the Trinity River Basin into the Sacramento River Basin. Trinity and Lewiston Dams currently regulate Trinity River flows below River Mile (RM) 112. With a capacity of 2.4 maf, Trinity Reservoir is the centerpiece of the TRD. Releases from Trinity Reservoir are re-regulated in Lewiston Reservoir prior to release downstream into the Trinity River. Lewiston Reservoir also acts as a forebay for the trans-basin export of water into Whiskeytown Reservoir via the Clear Creek Tunnel. Lewiston Dam marks the upstream limit of anadromous salmonid access.

From 1962 to 1979, CVP diversions delivered nearly ninety percent of the Trinity River annual water yield (above Lewiston) into the Sacramento River for urban and agricultural use. After 1979, river releases were increased from 110,000 acre-feet to 340,000 acre-feet, such that the diversion percentage was reduced to roughly seventy percent.

Prior to the completion of the TRD, flows in the Trinity River were highly variable, ranging from summer flows of 25 cfs to extreme winter events with instantaneous peak flows greater than 100,000 cfs. Annual hydrographs typically followed a seasonal pattern of high winter and spring flows followed by low summer and fall flows. Total annual flow volumes at Lewiston ranged from 0.27-2.7 maf, with an average of 1.2 maf. Since operation of the dam in 1964, an average of 74 percent of the river's flows has been exported annually, or about 988,000 af. In recent years (1985-1997) annual exports have decreased to an average of 732,400 af. Conversely, post-dam Trinity River flows at Lewiston have been as low as 121,000 af annually (10 percent of pre-dam levels).

Existing riparian vegetation is most prevalent from the Lewiston Dam to the confluence with the North Fork. This reach includes approximately 330 acres of early-successional willow-dominated vegetation, 170 acres of more mature later-successional alder-dominated vegetation, and 380 acres of willow-alder mix. Between the North Fork and the South Fork, the Trinity River channel is restricted by canyon walls that limit riparian vegetation to a narrow band. Peak flows in this reach have been impacted only modestly by dam operations. Between the South Fork and the Klamath River, the Trinity River alternates between confined reaches with little riparian vegetation to alluvial reaches with vegetation similar to pre-dam conditions in the reach between Lewiston Dam and the North Fork. At Trinity and Lewiston Reservoirs, plant species consist of those typically found in standing water and include floating species, rooted aquatic species, and emergent wetland species. Emergent wetland and riparian vegetation is constrained by fluctuating water levels and steep banks.

4.3 Local Setting

4.3.1 Salt Flat Bridge

The area subject to federal action includes the 9.11-acre project ESL and its immediate vicinity, including an approximately 1,300-foot reach of the active Trinity River channel surrounding the bridge site that could be subject to construction-related water quality impacts (**Figure 7**). Vegetation and aquatic habitat associated with the action area are described below. Site photographs are provided in **Appendix D**.

Project Site Conditions

The project action area includes the Salt Flat Road crossing on the Trinity River, the in-channel flood plain, portions of six privately owned parcels, and a portion of BLM-owned land. The project area extends up to approximately 700 feet upstream and 600 feet downstream of the existing bridge. Aquatic habitat and water quality were examined throughout this project reach.

The project is located in a rural area approximately 1.5 miles west of the northern California community of Lewiston. Salt Flat Road and the existing bridge provide access from Goose Ranch Road west to rural residences. The elevation at the project site is approximately 1,773 feet above sea level.

Current/Recent Land Use

The project area lies within the riparian corridor of the Trinity River and includes surrounding land used for rural residential development, roadways, and local recreation. Residential areas are located on either side of Goose Ranch Road and on both sides of the Trinity River. The residents west of the Trinity River rely on the Salt Flat Bridge to access their property.

Local Hydrological Setting

The Trinity River flows in a southerly direction through the project site. The regulated, typical summer base flow past this site is about 450 cfs and the recent 1997 flood flow was estimated to be about 11,000 cfs. The river consists of a bifurcated channel with the right channel carrying the majority of flow. The right channel is an engineered side-channel for salmonid spawning and rearing constructed by Reclamation in the early 1990's.

Water sources for the residents of the Salt Flat community have been developed in several ways. Stilling wells adjunct to the river are located immediately upstream and downstream of the existing bridge. Several residences have pumps in the river for domestic and irrigation uses.

Vegetation and Wildlife Habitat in the Study Area

In July 2002, NSR wetland scientists conducted a delineation of jurisdictional waters of the U.S. within the Salt Flat Bridge project ESL according to the methodology described in the 1987 Corps of Engineers Wetland Delineation Manual (USACE 1987). **Figure 7** depicts the five plant community types that occur within the project ESL / action area: montane hardwood - conifer, montane riparian, riparian wetland, seasonal wet meadow, and riverine. Descriptions for each of the five plant communities are presented below.

(Total Acreage)
Environmental Study Limit (9.11)
Road (0.51)
Plant Community Type
Montane Hardwood - Conifer (1.70)
Montane Riparian - Upland (2.26)
Wetland Habitat Type
Riparian Wetland (Montane Riparian) (2.15)
Riverine (~475 cfs) (2.48)
N
0 70 140 280
Feet
Nov. 2001 aerial photograph
FLOW
F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Salt_Flat_Plant_Wetland.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-28-03 tkoehler

North State Resources, Inc.

Figure 7. Salt Flat Plant Communities
Trinity River Bridges Project
Feb. 28, 2003

Montane Hardwood – Conifer

Montane hardwood – conifer habitat occurs along the western and eastern project boundaries (**Figure 7**). Dominant species in the canopy layer include ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*), with an occasional California black oak (*Quercus kelloggii*). Understory vegetation includes snowberry (*Symphoricarpos albus* var. *laevigatus*), deerbrush (*Ceanothus integerrimus*), and western bracken fern (*Pteridium aquilinum* var. *pubescens*). Annual grassland habitat is a minor component of the montane hardwood-conifer plant community within the Salt Flat Bridge ESL.

Montane Riparian / Riparian Wetland

Montane riparian habitat in the project area occurs in areas bordering the Trinity River (**Figure 7**). White alder (*Alnus rhombifolia*), narrow-leaved willow (*Salix exigua*), and arroyo willow (*Salix lasiolepis*) dominate the canopy; oregon ash (*Fraxinus latifolia*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are found less frequently. The understory is comprised of exotic Himalayan blackberry (*Rubus discolor*), interspersed with occasional California wild rose (*Rosa californica*), virgin's bower (*Clematis ligusticifolia*), torrent sedge (*Carex nudata*), velvet grass (*Holcus lanatus*), rush (*Juncus effusus*), gooseberry (*Ribes divaricatum*), Santa Barbara sedge (*Carex barbarae*), smooth scouring rush (*Equisetum laevigatum*), and poison hemlock (*Conium maculatum*). Riparian wetland habitat in the project ESL includes those portions of the montane riparian habitat that exhibited the three criteria (i.e., vegetation, soils, and hydrology) for classification as jurisdictional wetlands.

Seasonal Wet Meadow

Seasonal wet meadow habitat occurs in areas where water does not appear to pond but saturates to the surface for sufficient duration to create a wetland habitat. This habitat type is likely affected by hydrologic factors other than the Trinity River. Dominant species include Himalayan blackberry, curly dock, bur sedge (*Cyperus odoratus*), cockle bur (*Xanthium strumarium*), Italian and perennial ryegrass (*Lolium multiflorum* and *L. perennae*) and rabbitfoot polypogon (*Polypogon mouspeliensis*).

Riverine

NSR fishery biologists performed an aquatic habitat survey of the project ESL in October 2002. This survey included characterization of instream conditions (e.g., riverine habitat type, depth, substrate and cover) and delineation of SRA habitat, generally following the methodology of Flosi et al. (1998). The river at this project site consists of a main channel carrying the majority of the flow and an engineered side channel running through alluvial deposits along the left bank. The main channel, averaging about 90 feet in width, includes a long riffle-run series upstream of the existing bridge and a large boulder/bedrock and wood-enhanced pool followed by a long, deep run downstream of the bridge at typical summer flows (**Figure 8**). The side channel, averaging 27 feet in width, features relatively short and shallow riffle-pool-run series' throughout the ESL at typical summer flows. A sediment bar island varying in width from approximately 50 to 150 feet is formed between the two channels. The right channel riffle in this ESL is dominated by boulder and cobble substrates, while the pools are bedded primarily by cobbles and gravel. An engineered "feathered edge", consisting of spawning-sized gravels and occupying about 33-percent of the channel width, exists along the left

bank between about 215 and 295 feet downstream of the existing bridge. The average depths of the run and pool in the immediate vicinity of the bridge range from about 2 to 3 feet at summer base flow.

Within the side-channel, gravel and cobble dominate the riffles and runs; and cobbles, gravels and sand form the bed of pools. Depths averaged from 1 to 3 feet in the side-channel near the bridge. SRA habitat and early to mid-seral riparian vegetation covered 70-percent of the banks along the side channel.

Spring-run chinook salmon were observed spawning in riffles of the main channel and in the side channel within or near the ESL for this site. Spawning by chinook and coho salmon in most suitable riffle and tailout habitats within this ESL has been documented (C. Chamberlain, USFWS-Arcata, B. Aguilar, CDFG-Weaverville). Run and pool habitats appear to be suitable for juvenile salmonid rearing, in both the main and side channels. Rearing of juvenile chinook and coho salmon is also documented for this ESL (B. Aguilar, CDFG-Weaverville). Suitable fry habitat is limited to stream edges and the "feathered edge" run in the main channel, but is suitable in the riffles, pools and shallow runs of the side channel. The moderately deep run and pool downstream of the existing bridge appear suitable for over-summer holding of spring chinook salmon.

Shaded riverine habitat exists upstream and downstream of the existing bridge covering about 85-percent of the riverbanks within the ESL. Within the project ESL, montane riparian habitat grades into riverine habitat along the left bank floodplain. Montane riparian habitat in the project study area occurs as narrow bands of vegetation along some of the areas bordering the river channel. Dominant species include white alder, narrow-leaved willow, and arroyo willow.

4.3.2 Bucktail Bridge

The area subject to federal action includes the 13.71-acre project ESL and its immediate vicinity, including an approximately 500-foot reach of the active Trinity River channel surrounding the Bucktail Bridge that could be subject to construction-related water quality impacts (**Figure 9**). Vegetation and aquatic habitat associated with the action area are described below. Site photographs are provided in **Appendix D**.

Project Site Conditions

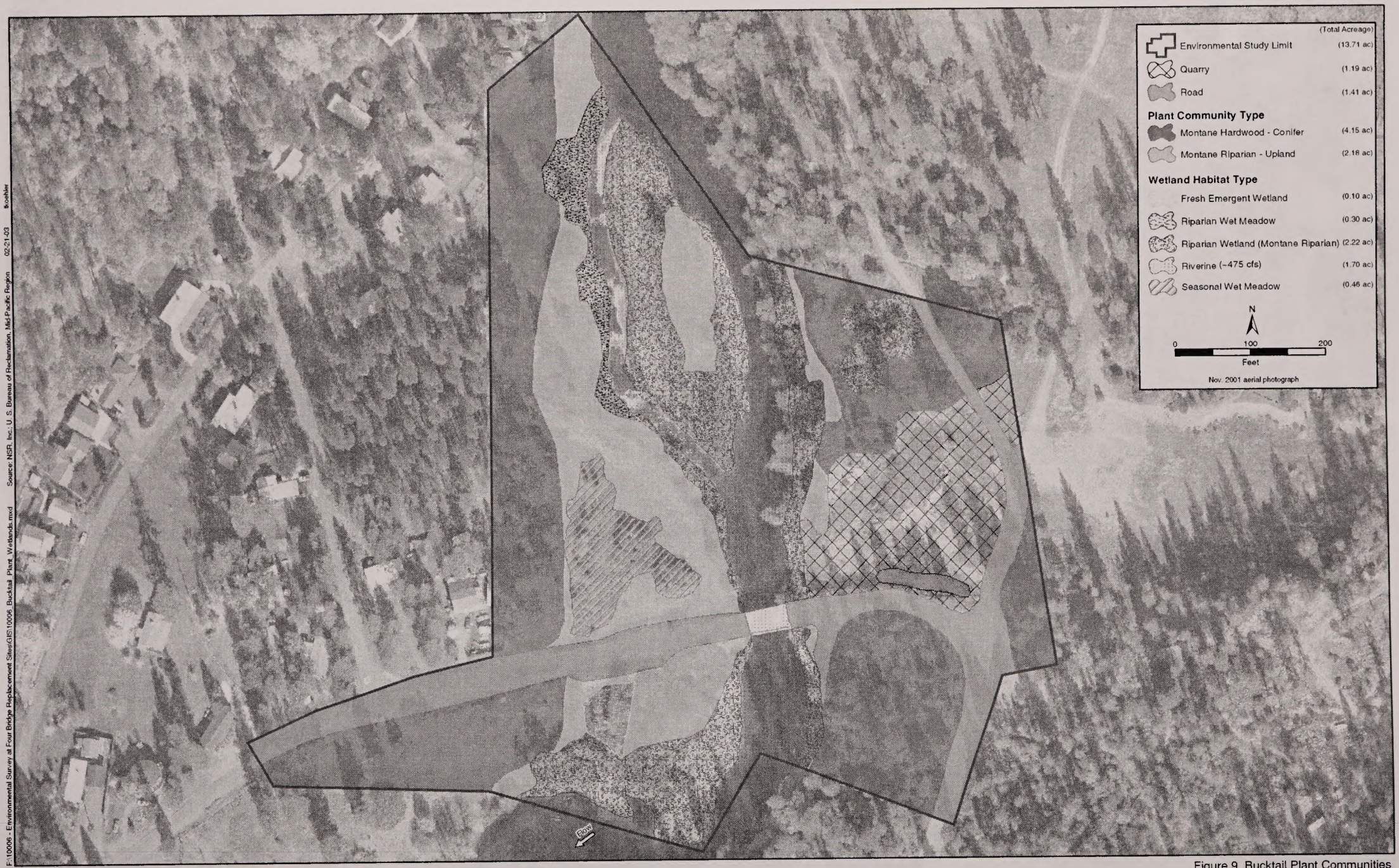
The project action area includes the Browns Mountain Road crossing over the Trinity River, the in-channel flood plain, portions of ten privately owned parcels, and portions of BLM land that include a rock quarry and Klamath mixed conifer upland habitat. Browns Mountain Road and the Bucktail Bridge are managed by Trinity County. The project area extends approximately 340 feet upstream and 150 feet downstream of the existing bridge. However, aquatic habitat and water quality conditions were examined for the area extending approximately 500-feet upstream and 600-feet downstream of the bridge.

The project is located in a rural area approximately 0.25 miles northeast of Lewiston Road, at River Mile 105. Browns Mountain Road and the existing bridge provide access from State Highway 299 north to rural residences and BLM-owned public access points to the Trinity River. The elevation at the project site is approximately 1751 feet above sea level.

F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006 Salt Flat Aquatic Habitat.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-06-03 tkoehler

North State Resources, Inc.

Figure 8. Salt Flat Aquatic Habitat
Trinity River Bridges Project
Feb. 6, 2003


(Total Acreage)
Environmental Study Limit (13.71 ac)
Quarry (1.19 ac)
Road (1.41 ac)
Plant Community Type
Montane Hardwood - Conifer (4.15 ac)
Montane Riparian - Upland (2.18 ac)
Wetland Habitat Type
Fresh Emergent Wetland (0.10 ac)
Riparian Wet Meadow (0.30 ac)
Riparian Wetland (Montane Riparian) (2.22 ac)
Riverine (~475 cfs) (1.70 ac)
Seasonal Wet Meadow (0.46 ac)
N
0
100
200
Feet
Nov. 2001 aerial photograph
Flow
P:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Bucktail_Plant_Wetlands.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-21-03 Boehler

North State Resources, Inc.

Figure 9. Bucktail Plant Communities
Trinity River Bridges Project
Feb. 21, 2003

Current/Recent Land Use

The project area lies within the riparian corridor of the Trinity River, which is currently developed up to the floodplain on the west side of the project area and undeveloped on the east side except for a rock quarry on BLM land. Surrounding land uses include rural residential development, roadways, recreation, and driveways. The Lewiston Community Plan identifies the Bucktail Bridge site as a major public river access point (i.e., Bucktail Hole is a popular fishing spot just downstream of the bridge). Designated parking is available northeast and southeast of the bridge, BLM public access points are located northeast and southwest of the bridge, and sanitary facilities are available southeast of the bridge.

Local Hydrological Setting

The Trinity River flows in a generally southerly direction through the project site. The regulated, typical summer base flow past this site is about 450 cfs and the recent 1997 flood flow was estimated to be about 11,000 cfs. The project site spans an overflow bypass channel along the right river bank that is formed by a levee separating the main river channel from the adjacent flood plain. Flow into the bypass channel is controlled at its upstream end by an earthen weir notched into the levee. The earthen weir is located about 290 feet upstream of the road crossing and is designed to divert a portion of the river when flows exceed 8,000 cfs. High flows passing through the bypass channel return to the main river at a large pool (Bucktail Hole) approximately 420 feet downstream of the county road bridge. At flows below 8,000 cfs, the bypass channel does not carry flowing water, although a backwater forms in the bypass channel with rising river stage from about 1,000 to 8,000 cfs (Ed Solbos, USBR, personal communication). There is a low-lying wetland area located in the bypass channel just downstream from the road crossing. It appears that water flows into the wetland only during periods of high flow, but may be sustained through the summer by subsurface flows in connection with the river.

The Bucktail subdivision is served by a community water system that supplies water for domestic and fire protection purposes. Deep wells and, storage tanks and a distribution system was developed in the 1980s, when a river intake was abandoned upstream of the present bridge.

Vegetation and Wildlife Habitat in the Study Area

In July 2002, NSR wetland scientists conducted a delineation of jurisdictional waters of the U.S. within the Bucktail Bridge project ESL according to the U.S. Army Corps of Engineers Wetland Delineation Protocol (USACE 1987). **Figure 9** presents the seven plant communities that occur within the Bucktail Bridge ESL / action area. Plant community types present within the project ESL include: montane hardwood - conifer, montane riparian, riparian wetland, fresh emergent wetland, seasonal wet meadow, riparian wet meadow, and riverine. Descriptions for each of the seven plant communities observed during site assessments are presented in the following paragraphs.

Montane Hardwood-Conifer

The montane hardwood - conifer plant community occurs along the western project boundary and in several locations in the eastern portion of the project area (**Figure 9**). The canopy is dominated by ponderosa pine, with minor Douglas-fir and incense cedar (*Calocedrus decurrens*) components. Understory vegetation is comprised of birch-leaf mountain mahogany (*Cercocarpus betuloides* var. *betuloides*) and whiteleaf manzanita (*Arctostaphylos viscida*).

Montane Riparian / Riparian Wetland

The montane riparian plant community occurs in areas bordering the Trinity River (**Figure 9**). Dominant species in the canopy layer include white alder and narrow-leaved willow. Dense thickets of California blackberry (*Rubus ursinus*), lianas of California wild grape (*Vitis californica*), and mugwort (*Artemisia douglasiana*) dominate the understory. Riparian wetland habitat in the project ESL includes those portions of the montane riparian habitat that exhibited the three criteria (i.e., vegetation, soils, and hydrology) for classification as jurisdictional wetlands.

Fresh Emergent Wetland

The fresh emergent wetland plant community that occurs within the Bucktail Bridge project ESL is characterized by erect or floating, rooted, herbaceous hydrophytes (**Figure 9**). Dominant species include narrow-leafed cattail (*Typha angustifolia*) and small-fruited bulrush (*Scirpus microcarpus*) within the emergent wetland surrounded by, narrow-leafed willow, red willow (*Salix laevigata*), Himilayan blackberry, and white alder.

Seasonal Wet Meadow

Seasonal wet meadow habitat occurs in areas where water does not appear to pond but saturates to the surface for sufficient duration to create a wetland habitat (**Figure 9**). This habitat type is likely affected by hydrologic factors other than the Trinity River. Within the Bucktail Bridge ESL this habitat type is dominated by Himalayan blackberry, curly dock, bur sedge, cockle bur, Italian and perennial ryegrass and rabbitfoot polypogon.

Riparian Wet Meadow

Riparian wet meadow habitat occurs adjacent to the Trinity River, which exerts a hydrologic influence on this plant community type (**Figure 9**). However, the riparian wet meadow habitat displays a different assemblage of wetland species than is found in the montane riparian community. Dominant species include small-fruited bulrush (*Scirpus microcarpus*), tufted hairgrass (*Deschampsia cespitosa*), velvet grass, smooth scouring rush, and white alder.

Riverine

NSR fishery biologists performed an aquatic habitat survey of the project ESL in October 2002. This survey included characterization of instream conditions (e.g., riverine habitat type, depth, substrate and cover) and delineation of SRA habitat, generally following the methodology of Flosi et al. (1998). The project site includes an overflow bypass channel along the right riverbank that is formed by a levee separating the main river channel from the adjacent flood plain. This bypass channel is dry during the summer, except for a low-lying wetland on the downstream side of the road crossing. A backwater habitat forms in the bypass channel with rising river stage from about 1,000 to 8,000 cfs (Ed Solbos, USBR, personal communication). At flows greater than 8,000 cfs, the bypass conveys river flow to lessen the flows in the main river channel passing beneath the county road bridge.

The main river channel adjacent to the project site within the ESL, averages about 60 feet in width during summer flows, and is characterized by a typical riffle-pool-run sequence with a prominent pool, locally known as "Bucktail Hole", immediately downstream of the bypass channel (**Figure 10**). A small, shallow, engineered side channel exists immediately upstream of the bypass channel's

earthen weir and levee structure. Relatively deep pool habitats with short riffle sections separating them exist immediately beneath and downstream of the county road bridge. Cobbles and gravels dominate the river habitats throughout this ESL. The bypass channel is primarily a sand bed. The pools in this ESL are relatively deep ranging from 7 feet at the bridge to over 12 feet in the "Bucktail Hole" downstream of the bridge and at the terminus of the bypass channel. The riffles and runs in this ESL are 1 to 3 feet deep on average.

Spawning of chinook and coho salmon within this ESL is documented to occur in most of the suitable riffle and run tailouts (C. Chamberlain, USFWS-Arcata, B. Aguilar, CDFG-Weaverville). Rearing by juvenile chinook and coho salmon, especially within the side-channel habitat upstream of the existing bridge and bypass levee, is also documented to occur (B. Aguilar, CDFG-Weaverville). Salmon fry have been observed in the edgewater habitat along the right bank of the run upstream of the existing bridge (Gallagher 1999). The large pool, "Bucktail Hole", at the downstream end of the ESL appears to have high suitability for oversummer holding of spring chinook.

SRA habitat is limited in this ESL primarily to about 50-percent of the left bank both upstream and downstream of the existing bridge. The large "Bucktail Hole" at the terminus of the bypass channel is largely vegetated on both banks providing shaded riverine habitat values. Montane riparian habitat in the project study area occurs as narrow bands of vegetation along some of the areas bordering the flood bypass channel. Dominant montane riparian species at the Bucktail Bridge site include narrow-leaved willow and white alder.

4.3.3 POKER BAR

The area subject to federal action includes the 7.85-acre project ESL and its immediate vicinity, including a reach of about 300-feet surrounding the existing bridge site in the active Trinity River channel that could be subject to construction-related water quality impacts (**Figure 11**). Vegetation and aquatic habitat associated with the action area are described below. Site photographs are provided in **Appendix D**.

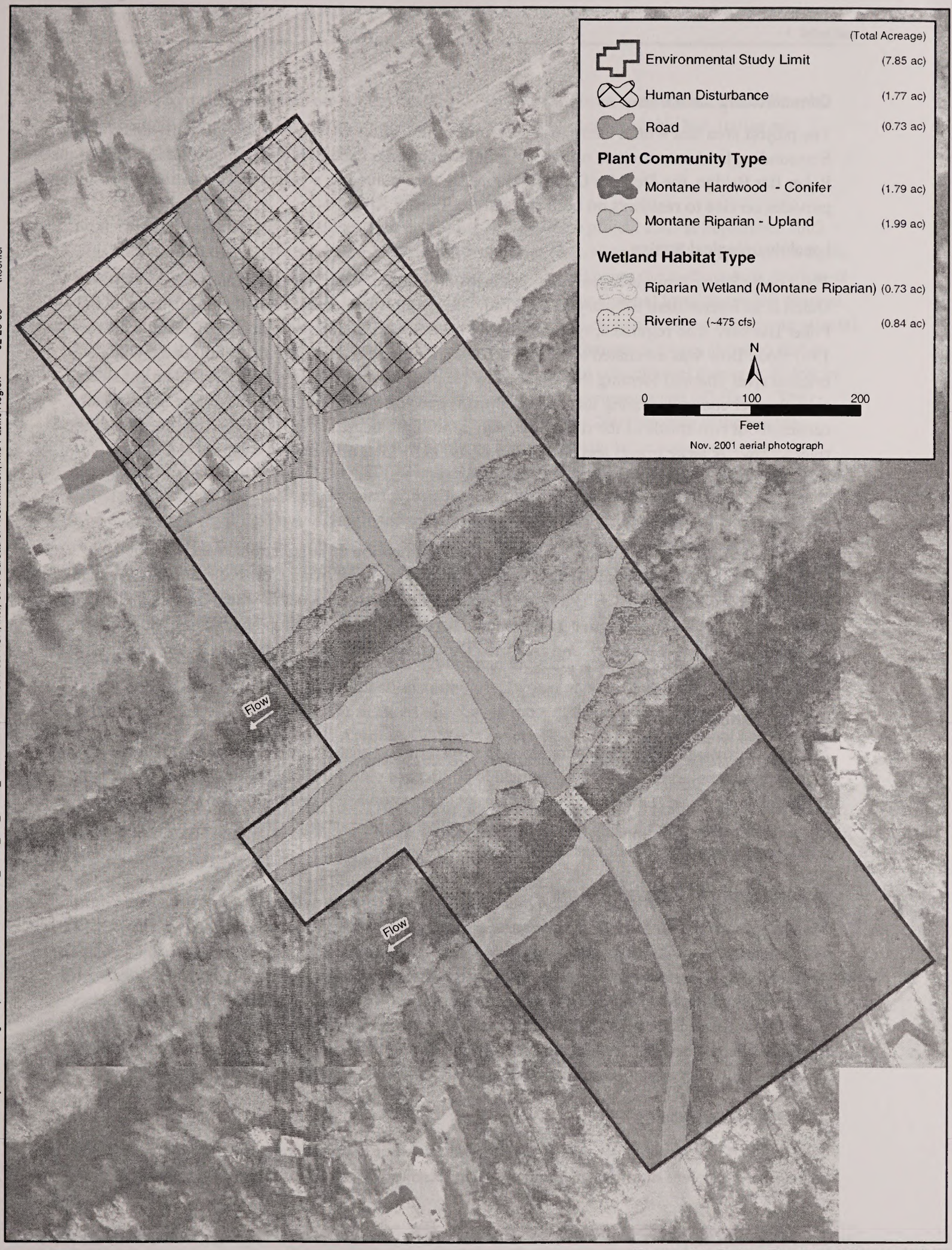
Project Site Conditions

The project action area includes the Poker Bar Bridge crossing on the Trinity River, the in-channel floodplain, and portions of five privately-owned properties, which are predominantly unvegetated. The project area extends approximately 150 feet up- and downstream of the existing bridge. However, aquatic habitat and water quality conditions were examined for the river extending approximately 400-feet upstream and 500-feet downstream of the bridge site.

The project is located in a rural area 1.5 miles north of State Highway 299 in Trinity County, about halfway between the towns of Lewiston and Douglas City. Bridge Road and the existing Poker Bar bridge provide access from State Highway 299 to seventy-seven (77) rural residences and undeveloped parcels to the north. The elevation at the project site is approximately 1721 feet above sea level.

North State Resources, Inc.

Figure 10. Bucktail Aquatic Habitat
Trinity River Bridges Project
Feb. 6, 2003



North State Resources, Inc.

Figure 11. Poker Bar Plant Communities
Trinity River Bridges Project
Feb. 25, 2003

Current/Recent Land Use

The project area lies within the riparian corridor of the Trinity River, which is currently undeveloped. Surrounding land uses include rural residential development and roadways. Immediately south of the Poker Bar Bridge, the Douglas City Rural Fire District maintains a volunteer fire station. This station provides service to residents on both sides of the Trinity River.

Local Hydrological Setting

The Trinity River flows in a generally southwesterly direction through the project site. Tom Lang Gulch is an intermittent tributary to the Trinity River approximately one-half mile upstream of the Poker Bar site. The regulated, typical summer base flow past this site is about 450 cfs and the recent 1997 flood flow was estimated to be about 15,000 cfs. The river at this site is bifurcated with the original river channel forming the left channel running against a bedrock hillside and an engineered side-channel channel running through an alluvial bed forming the right channel. The left channel carries about two-thirds of the river flow, while the right side-channel carries about one-third of the river's flow. A large gravel and cobble bar island is formed between the channels and is approximately 200 feet wide at the existing bridges.

Vegetation and Wildlife Habitat in the Study Area

In July 2002, NSR wetland scientists conducted a delineation of jurisdictional waters of the U.S. within the Poker Bar bridges project ESL according to the U.S. Army Corps of Engineers Wetland Delineation Protocol (USACE 1987). Five plant community types occur within the Poker Bar Bridge project ESL / action area (**Figure 11**): montane hardwood - conifer, montane riparian, riparian wetland, seasonal wet meadow, and riverine. Descriptions for each of these plant community types are presented below.

Montane Hardwood - Conifer

Montane hardwood - conifer occurs along the western and eastern project boundaries (**Figure 11**). Dominant species in the canopy layer include ponderosa pine and Douglas-fir, with an occasional California black oak. Understory vegetation includes snowberry, deerbrush, and western bracken fern. Annual grassland habitat is a minor component of the montane hardwood-conifer plant community within the Poker Bar Bridge ESL.

Montane Riparian / Riparian Wetland

Montane riparian habitat in the project area occurs in areas bordering the Trinity River (**Figure 11**). White alder, narrow-leaved willow, and arroyo willow dominate the canopy; oregon ash and black cottonwood are found less frequently. The understory is comprised of exotic Himalayan blackberry, interspersed with occasional California wild rose, virgin's bower, torrent sedge, velvet grass, rush, gooseberry, Santa Barbara sedge, smooth scouring rush, and poison hemlock. Riparian wetland habitat in the project ESL includes those portions of the montane riparian habitat that exhibited the three criteria (i.e., vegetation, soils, and hydrology) for classification as jurisdictional wetlands.

Seasonal Wet Meadow

Seasonal wet meadow habitat occurs in areas where water does not appear to pond but saturates to the surface for sufficient duration to create a wetland habitat (**Figure 11**). This habitat type is likely

affected by hydrologic factors other than the Trinity River. Dominant species observed within this plant community include Himalayan blackberry, curly dock, bur sedge, cockle bur, Italian and perennial ryegrass and rabbitfoot polypogon.

Riverine

NSR fishery biologists performed an aquatic habitat survey of the project ESL in September 2002. This survey included characterization of instream conditions (e.g., riverine habitat type, width, depth, substrate and cover) and delineation of SRA habitat, generally following the methodology of Flosi et al. (1998). The river at this site is bifurcated with the original river channel forming the left channel running against a bedrock hillside and an engineered side-channel channel running through an alluvial bed forming the right channel. At typical summer flows, the left channel averages about 65 feet in width and carries about two-thirds of the river flow, while the right side-channel averages 54 feet in width and carries about one-third of the river's flow during typical summer and fall flows. The sediment bar island formed between the channels is approximately 200 feet wide at the existing bridges. Both channels exhibit typical riffle-pool-run sequences with large scour pools directly beneath the existing bridges (**Figure 12**). The left channel riffles are dominated by gravel and cobbles. The runs and pools are bedded with cobbles and large boulders throughout the left channel. The engineered right channel is composed mostly of a gravel-cobble-small boulder bed, with gravel dominating in the riffles and cobbles and boulders in the flatwater sections. The pools formed beneath both the right- and left channel bridges are relatively deep, averaging about 4 feet in the right channel and 6.5 feet in the left channel during typical summer flows. In general, habitats are deeper in the left channel throughout this ESL.

Spring-run chinook salmon were observed spawning in the riffles and run tailouts near the upstream end of both channels of this ESL, indicating suitable spawning gravels. Spawning of chinook and coho salmon within this ESL is documented to occur in most of the suitable riffle and run tailouts (C. Chamberlain, USFWS-Arcata, B. Aguilar, CDFG-Weaverville). The large, deep pool and run near the existing left channel bridge appears suitable as oversummering habitat for adult spring chinook salmon. Juvenile rearing habitat appears suitable in the runs and pools throughout this ESL and is documented to occur within this ESL (B. Aguilar, CDFG-Weaverville). Suitable fry habitats appear limited to the edgewater of the run upstream of the left channel bridge and in the shallow runs, riffles, and associated edgewater in the engineered right side-channel.

Both channels exhibit extensive mid- to late seral riparian vegetation contributing SRA habitat along both banks, averaging about 70-percent of the total bank length throughout the ESL. Montane riparian habitat abruptly transitions to riverine habitat along a floodplain terrace on both banks of each channel. Montane riparian habitat occurs as narrow bands of vegetation on either side of the two river channels that traverse the project area. Dominant species in the canopy layer include white alder, Goodding's black willow, narrow-leaved willow, and black cottonwood.

F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Poker_Bar_Aquatic_Habitat.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-06-03 lkoehler

North State Resources, Inc.

Figure 12. Poker Bar Aquatic Habitat
Trinity River Bridges Project
Feb. 6, 2003

4.3.4 BIGGERS ROAD BRIDGE

The area subject to federal action includes the 3.82-acre project ESL and its immediate vicinity, including a reach of about 400-feet surrounding the existing bridge site in the active Trinity River channel that could be subject to construction-related water quality impacts (**Figure 13**). Vegetation and aquatic habitat associated with the action area are described below. Site photographs are provided in **Appendix D**.

Project Site Conditions

The project action area includes the existing bridge crossing on the Trinity River, the in-channel flood plain, a portion of Steel Bridge Road, and portions of private properties. The project area extends approximately 200 ft upstream and downstream of the existing bridge. However, aquatic habitat and water quality were examined for the area extending approximately 700-feet upstream and 500-feet downstream of the bridge site. The project is located in a rural area 3 miles east of Douglas City in Trinity County. Biggers Road and the existing bridge provide access from Steel Bridge Road to rural residences located on the right (west) side of the Trinity River. The elevation at the project site is approximately 1659 feet above sea level.

Current/Recent Land Use

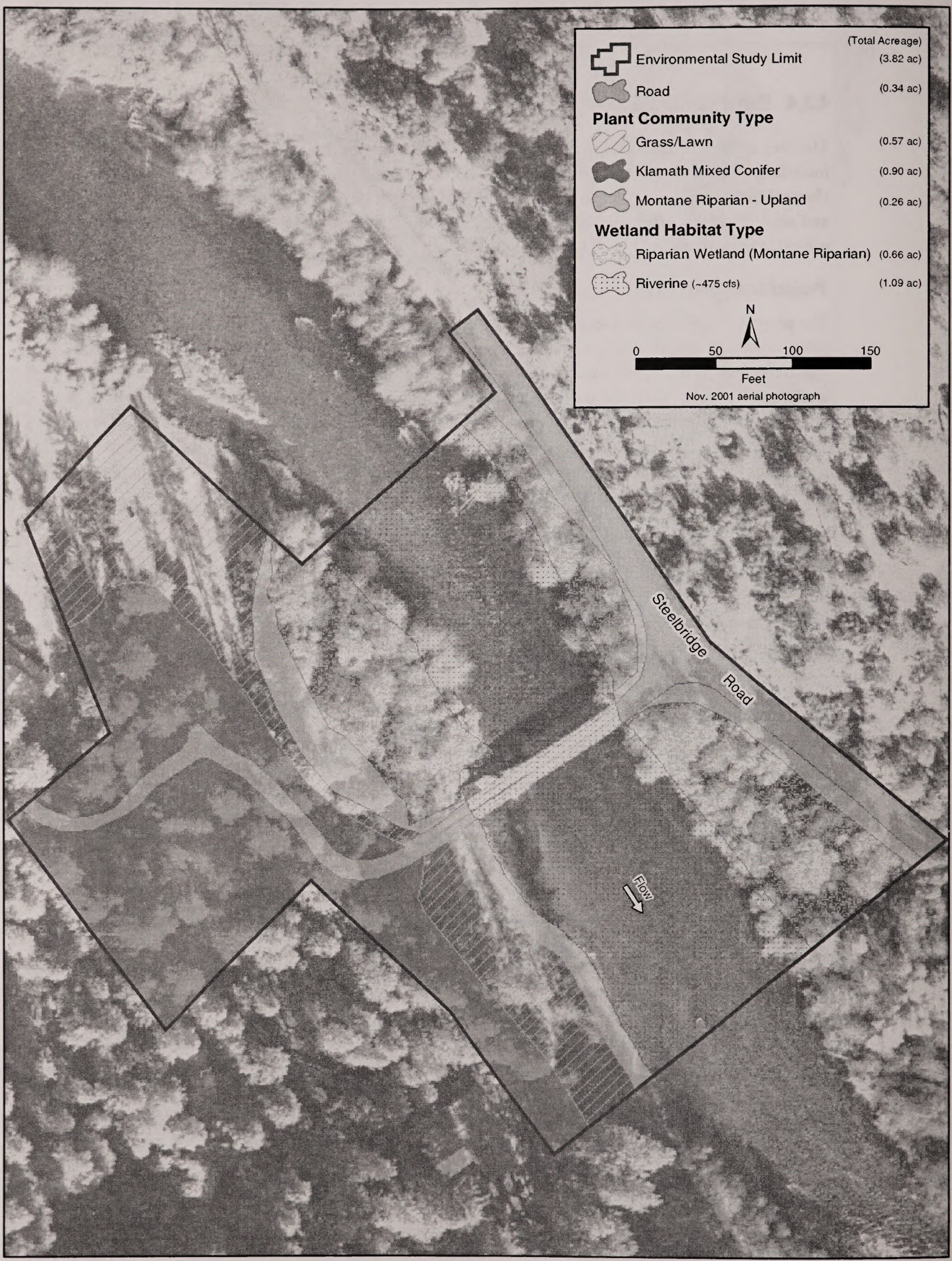
The project area lies within the riparian corridor of the Trinity River, which is currently undeveloped. Surrounding land uses include rural residential development, roadways, and driveways, which together create a relatively large un-vegetated area within and adjacent to the study area. Trinity County maintains Steel Bridge Road as a primary access route into this area. Access is provided for residential and recreational uses adjacent to the Trinity River.

Local Hydrological Setting

The Trinity River flows in a generally southeasterly direction through the project site. MacIntyre Gulch is an intermittent tributary to the Trinity River in the project vicinity. The regulated, typical summer base flow past this site is about 450 cfs and the recent 1997 flood flow was estimated to be about 15,000 cfs. A single, broad river channel exhibiting an alternating series of long riffles and deep run habitats occurs at this site.

Vegetation and Wildlife Habitat

In July 2002, NSR wetland scientists conducted a delineation of jurisdictional waters of the U.S. within the Biggers Road Bridge project ESL according to the U.S. Army Corps of Engineers Wetland Delineation Protocol (USACE 1987). Four plant community types occur within the Biggers Road Bridge project ESL / action area (**Figure 13**): Klamath mixed conifer, montane riparian, riparian wetland, and riverine. A fifth community type, montane hardwood - conifer, occurs directly adjacent but outside the study area. Plant community types described throughout this document are adapted from descriptions provided in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer



F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Biggers_Plant_Wetland.mxd Source: North State Resources, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-25-03 tkoehler

North State Resources, Inc.

Figure 13. Biggers Road Plant Communities
Trinity River Bridges Project
Feb. 25, 2003

1988). Descriptions for each of the four plant community types observed during site assessments are presented below.

Klamath Mixed Conifer

Klamath mixed conifer habitat occurs along the western project boundary (**Figure 13**). The canopy is dominated by Douglas-fir and ponderosa pine; subdominant species include California black oak, Pacific madrone (*Arbutus menziesii*), and canyon live oak (*Quercus chrysolepis*). Other species observed in the understory include poison oak (*Rhus diversiloba*), Sierra gooseberry (*Ribes roezlii*), snowberry, Sierran sweet-cicely (*Osmorhiza occidentalis*), blue wildrye (*Elymus glaucus*), white-flowered hawkweed (*Hieracium albiflorum*), false hedge-parsley (*Torilis arvensis*), and western bracken fern.

Montane Riparian / Riparian Wetland

Montane riparian habitat occurs in the riparian zone adjacent to rivers, streams and springs. This plant community type usually occurs as a narrow, dense strip of broadleaved, winter deciduous trees with a sparse understory. The species composition in this habitat type is quite variable, and the structure is similarly diverse. At the Biggers Road Bridge site, montane riparian habitat occurs in areas bordering the Trinity River (**Figure 13**). Dominant species in the canopy layer include white alder and narrow-leaved willow. Other species observed in the canopy include arroyo willow and Oregon ash. Understory species include Himalayan blackberry, sweet pea (*Lathyrus latifolia*), virgin's bower, California wild grape, Douglas' spirea (*Spiraea douglasii*), torrent sedge, velvet grass, rush, and mugwort. Riparian wetland habitat in the project ESL includes those portions of the montane riparian habitat that exhibited the three criteria (i.e., vegetation, soils, and hydrology) for classification as jurisdictional wetlands.

Additional community types located within the Biggers Road Bridge project ESL include portions of Biggers' and Biggers Road's grass lawns and montane hardwood-conifer habitat. Montane hardwood - conifer habitat occurs in the easternmost portion of the project study area but outside of the project ESL, on the east side of Steel Bridge Road. Dominant species include canyon live oak and gray pine (*Pinus sabiniana*), with scattered California black oak and ponderosa pine. The understory is sparsely populated; buckbrush (*Ceanothus cuneatus*) and non-native grasses dominate.

Riverine

NSR fishery biologists performed an aquatic habitat survey of the project ESL in September 2002. This survey included characterization of instream conditions (e.g., riverine habitat type, width, depth, substrate and cover) and delineation of SRA habitat, generally following the methodology of Flosi et al. (1998). A single, broad river channel exhibiting an alternating series of long riffles and deep run habitats during summer and fall flows occurs at this site. The river is relatively wide averaging about 110 feet in width along the ESL. A long, deep run, ranging in depth from 3 to 5 feet, is formed immediately beneath the existing bridge and extends from about 100 feet upstream to 200 feet downstream of the bridge (**Figure 14**). Gravel and cobbles dominate the riffles, and cobbles and boulders form the bed of the runs throughout this ESL.

F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Treadwell_Aquatic_Habitat.mxd Source: NSR, Inc.; U.S. Bureau of Reclamation, Mid-Pacific Region, Dept. of Water Resources, No. District 02-06-03 Roehler

North State Resources, Inc.

Figure 14. Biggers Road Aquatic Habitat
Trinity River Bridges Project
Feb. 6, 2003

Spring chinook salmon were observed spawning in the tailout of the run and the long riffle below the existing bridge. Suitable habitats throughout this ESL are documented to support regularly observed spring- and fall-run chinook and coho salmon spawning (C. Chamberlain, USFWS-Arcata; B. Aguilar, CDFG-Weaverville). Runs and the edgewater associated with riffles within this ESL appear to be suitable for juvenile and fry salmonid rearing.

The left bank provides a continuous, narrow strand of mid- and late-seral riparian vegetation contributing to SRA habitat against that bank. The right bank is developed with residential lawn dominating the bank in the vicinity of the existing bridge. Natural riparian vegetation resumes about 200 feet downstream of the existing bridge and provides high value. Montane riparian habitat abruptly transitions into riverine habitat along the flood terrace throughout this ESL. Dominant species in the canopy layer include white alder and narrow-leaved willow.

Section 5

Species Account and Status of the Species in the Action Area

5.1 Species Account

5.1.1 Status of the Species

A written request was submitted to the USFWS for a list of federal special-status species potentially occurring on the *Weaverville* and *Lewiston* USGS 7.5 minute quadrangles. In a letter dated April 9, 2002, the USFWS provided a list (Reference number 1-14-2002-1083) that included three bird species and one fish species that currently have threatened or candidate status, within the *Weaverville* and/or *Lewiston* quadrangles, and can occur within the project sites (**Appendix C**).

A search of the California Natural Diversity Database (CNDDB) for special-status wildlife, botanical, and fish resources reported within the project vicinity (10-mile radius), including nine U.S. Geological Survey (USGS) 7.5-minute quadrangles (*Rush Creek Lakes, Trinity Dam, Papoose Creek, Junction City, Weaverville, Lewiston, French Gulch, Hoosimbim Mountain, and Bully Choop Mountain*), did not result in any listed fish records.

The NMFS website was accessed and indicated that the project area is within the current known range of the SONCC ESU coho salmon, Klamath Mountains Province ESU steelhead, and the Upper Klamath-Trinity Rivers ESU chinook salmon.

Local fisheries biologists familiar with the Trinity River watershed were also contacted to discuss the potential for coho and chinook salmon occurrence, known aquatic habitat, and water quality conditions within the project ESL's.

The primary hydrologic feature in the project area is the Trinity River. Due to the connectivity between the river and the Pacific Ocean, the river is accessible to anadromous fish. Anadromous fish on the west coast of the U.S. spend a portion of their life cycle in the Pacific Ocean, and the remainder in freshwater tributaries that are accessible from the ocean. In the project area, this includes winter- and summer/fall-run steelhead (Klamath Mountains Province ESU), fall- and spring-run chinook salmon (Upper Klamath-Trinity Rivers ESU), and coho salmon (SONCC ESU).

Special-status fish species known to inhabit the Trinity River and their current listing status are provided in **Table 5-1**. A detailed species account for the one federally listed species, SONCC ESU coho salmon, that occurs in the action area follows.

TABLE 5-1
SPECIAL-STATUS FISH SPECIES CONSIDERED FOR ANALYSIS, TRINITY RIVER BRIDGES PROJECT

Common Name (Scientific Name)	Status FED/ST	General Habitat	Comments
Pacific lamprey (*Lampetra tridentata*)	SC/SC	Spawn in freshwater rivers and streams with juveniles found in slow-moving current, silty bottom habitats; metamorphosed juveniles migrate through estuaries to the ocean.	Observed to spawn in Browns Creek (Deibel 1988), near the project sites; Ammoecetes abundant during spring throughout the reach where project sites are located. **The species may occur at all project locations.**
Green sturgeon (*Acipenser medirostris*)	C/SC	Known to spawn in the lower Klamath River, and juveniles may occur in the estuary. Prefers to spawn over large cobble during relatively high flows.	The species may be found in the lower Trinity River, but is not known to inhabit the upper Trinity River. **Project study area is outside the known range for the species.**
So. OR/No. CA ESU coho salmon (*Oncorhynchus kisutch*) Designated Critical Habitat	T/T	Juveniles prefer deep (≥ 1 m) pools with dense overhead cover, and clear water. Found over a range of substrates from silt to bedrock (Moyle et al., 1995). Trinity River is designated critical habitat and essential fish habitat.	Suitable spawning, rearing, and/or migration corridor habitat exists at or near all project sites. **All four bridge sites are within designated critical habitat. The species is known to occur at all project locations.**
Klamath Mts. Province ESU steelhead (*Oncorhynchus mykiss irideus*) (summer/fall-run, and winter-run races)	NW/SC	Freshwater rivers and streams. (Trinity and Klamath Rivers and their tributaries). Steelhead require cool, swift shallow water; clean, loose gravel for spawning; and suitable large pools in which to spend the summers (CNDDB, CDFG 2002a).	Summer race is a state species of special concern. Suitable spawning, rearing, and/or migration corridor habitat exists at or near all project sites. **The species is known to occur at all project locations.**
Upper Klamath-Trinity Rivers ESU chinook salmon (*Oncorhynchus tshawytscha*) (spring-run and fall-run races)	NW/SC	Freshwater rivers and streams. (Trinity and Klamath Rivers and their tributaries). Chinook salmon require cool streams with deep pools and riffles, and gravel or cobble substrate. Trinity River is designated essential fish habitat for the species.	Spring-run race is a state species of special concern. Suitable over-summering, spawning, rearing, and migration corridor habitat exists at or near all project sites. **The species is known to occur at all project locations.**

NOTES:

Federal & State Status Codes: E = Endangered; NW = Not Warranted; T = Threatened; C = Candidate Species; SC = Species of Concern

The SONCC ESU coho salmon was listed as threatened under the federal ESA on April 25, 1997 (May 6, 1997, 62 CFR 24588). This listing includes populations occurring from Cape Blanco, Oregon, south to Punta Gorda, California, including coho salmon in the Trinity and Klamath rivers. Designated critical habitat for the ESU was finalized on May 5, 1999 (64 CFR 24049). Critical habitat for the SONCC ESU coho salmon encompasses all accessible river reaches, including estuaries and tributaries, from the Elk River in Oregon to the Mattole River in California. Excluded are areas above specific dams or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). In the Trinity River Basin, designated critical habitat for the SONCC ESU coho consists of the water, substrate, and adjacent riparian zone

of those estuarine and riverine reaches (including off-channel habitats and accessible tributaries) downstream of Lewiston Dam (64 CFR 24049).

On July 28, 2000, the California Fish and Game Commission (Commission) received a petition to list coho salmon north of San Francisco as an endangered species under provisions of CESA. The Commission referred the petition to CDFG on August 7, 2000, for evaluation. The CDFG found that the information in the petition was sufficient to declare coho salmon a candidate species on April 27, 2001. In April 2002, CDFG published a status review, in which they recommended that the SONCC ESU coho be listed as threatened under CESA. The Commission accepted the findings of CDFG and published a notice that the SONCC ESU coho salmon warranted listing as a threatened species under state law on September 6, 2002. Regulations to implement the listing will be delayed one year pending development of a recovery plan. Incidental take is currently allowed under Section 2084 of the California Fish and Game Code.

The Upper Klamath-Trinity Rivers ESU of chinook salmon includes all naturally spawned populations of chinook salmon in the Klamath and Trinity River Basins upstream of the confluence of the Klamath and Trinity Rivers. In September 1994, NMFS initiated a comprehensive coast-wide status review for west coast chinook and other salmon species, including the Upper Klamath-Trinity Rivers ESU of chinook salmon. On March 9, 1998, NMFS determined that listing was not warranted for this ESU (CFR Vol. 63, No. 45, March 9, 1998).

5.1.2 Life History

Most adult coho salmon enter rivers between mid-September through January, primarily as three year olds, and spawn from November to January (Shapovalov and Taft 1954; Leidy and Leidy 1984; Hassler 1987; Weitkamp *et al.* 1995; Moyle 2002). Coho salmon migrate into rivers usually after heavy fall or winter rains raise river flows sufficiently to breach sand bars that form at the mouths of many coastal rivers over the summer, but fish can enter larger rivers earlier (Shapovalov and Taft 1954; Weitkamp *et al.* 1995; Moyle 2002). Coho salmon begin entering the Klamath River estuary in early- to mid-September (Leidy and Leidy 1984; Baker and Reynolds 1986). In the Klamath River Basin, coho salmon generally prefer smaller tributaries for spawning than those used by chinook salmon (Leidy and Leidy 1984; Baker and Reynolds 1986; CDFG 2002b). Spawning is concentrated in riffles or in gravel deposits at the tailouts (downstream end) of pools and runs with suitable water depth and velocity. Use of suitable spawning habitat by coho salmon is locally known for all four Trinity River bridge project sites (J. Glase, USFWS-Arcata, B. Aguilar, CDFG-Weaverville).

Egg incubation generally lasts for about 35 to 50 days, depending on water temperature (Sandercock 1991). Fry start emerging from the gravel two to three weeks after hatching, beginning from about February and continuing through mid-May (Leidy and Leidy 1984; Hassler 1987). Following emergence, fry move into shallow areas near the stream banks. As coho salmon fry grow, they disperse upstream and downstream, usually remaining in, or moving into, small tributary streams, and establish and defend territories (Leidy and Leidy 1984; Hassler 1987). Coho salmon are locally known to use suitable rearing habitats for each of the Trinity River bridge project sites, except at Biggers Road Bridge where no juvenile salmonid rearing has been observed (B. Aguilar, CDFG-Weaverville).

During the summer, coho salmon fry prefer shallow pools and riffles with cover such as large woody debris, undercut banks, boulders, and overhanging vegetation (Shapovalov and Taft 1954). Juvenile coho salmon prefer to over-winter in large mainstem pools, backwater areas and secondary pools with large woody debris, and undercut bank areas (Hassler 1987; Heifetz *et al.* 1986). Juveniles primarily eat aquatic and terrestrial insects (Sandercock 1991). Coho salmon rear in fresh water for up to 15 months, then migrate to the sea as smolts generally from February through mid-June, peaking in April and May (Shapovalov and Taft 1954; Leidy and Leidy 1984; Weitkamp *et al.* 1995). In rivers of low productivity (nutrient-limited or low temperatures), or where spawning is late in the season, fish may not attain smolt size within a year, potentially affecting longer juvenile freshwater residency periods (CDFG 2002b). This long period of freshwater residency provides for juvenile coho to attain larger sizes at outmigration relative to fall-run chinook salmon, and most other species of anadromous salmonid, except for steelhead which also emigrate as larger juveniles (Sandercock 1991; Moyle 2002). This life history strategy benefits smolts with higher survival in the estuaries and ocean (Sandercock 1991; Pearcy 1992). However, this longer period of freshwater residency also subjects juvenile coho to higher freshwater mortality rates if conditions become adverse, such as during drought and natural or land use-triggered catastrophic events (Sandercock 1991).

Temperature is an important physical factor affecting the freshwater residency and survival of coho salmon. The effect of temperature on anadromous salmonids is not a simple relationship. Temperature is interrelated with other ecological factors, such as prey availability, predator and competitor species present, thermal refugia, life stage, and the acclimation and exposure history of individual fish, in its ultimate effect on salmon (Marine 1997, Ligon et al. 1999, McCullough 1999). In general, juvenile coho can tolerate a range of temperatures from about 2°C to 22.5°C, however, their preference for 12°C to 14°C, approximates the range where optimum growth occurs (Brett 1952). Temperatures from 6°C to 12°C appear to be optimal for the period of smoltification, generally the winter through early summer seasons (Zaugg and McLain 1972; Zaugg and McLain 1976; Clarke et al. 1981, Zedonis and Newcomb 1997). Temperatures exceeding about 15°C result in reversal of the physiological transformation associated with smoltification (Zaugg and McLain 1972; Zaugg and McLain 1976).

While living in the ocean, coho salmon remain closer to their river of origin than do chinook salmon (Sandercock 1991; Pearcy 1992). Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as three year-olds. Some precocious males, referred to as "jacks", return to spawn after only about six months at sea. Interannual variations in run sizes of coho salmon, and other species of Pacific salmon, show close associations with climatic and oceanic cyclic phenomena such as drought, storms, El Niño/La Niña events, decadal oscillations, which can alter the physical and chemical conditions and biological productivity of the sea and inland habitats (Pearcy 1992, CDFG 2002b, and Moyle 2002).

5.1.3 POPULATION TRENDS

Coho salmon are thought to have occurred historically as smaller populations compared to chinook salmon and steelhead in the Klamath and Trinity River basins (Snyder 1931; Moyle 2002). Early surveys indicated that relatively few coho were observed above the present day site of Lewiston Dam on the Trinity River (Moffett and Smith 1950). However, subsequent reports provided evidence that juvenile coho salmon were identified in irrigation diversions upriver from the current location of

Trinity Reservoir in the 1950's (USFWS & CDFG 1956). Pre-dam estimates for coho salmon spawning in the Trinity River, above Lewiston, were 5,000 fish (USFWS & CDFG 1956).

Brown and Moyle (1991) estimated for all California coho salmon stocks that there has been a reduction in natural coho spawning abundance of 85-percent to 94-percent since the 1940's. By the late 1980's, they estimated that wild coho spawning in California streams did not exceed between 100 to 1,300 fish. Further, they stated that 46-percent of California streams which historically supported coho salmon populations no longer supported runs. However, within the California portion of the SONCC ESU, coho salmon have been recently documented to occupy 61-percent of the historical streams identified by Brown and Moyle (1991) to support coho runs (CDFG 2002b)

The 1995 NMFS status review of coastwide coho salmon summarized the contemporary condition of the SONCC ESU coho as follows:

> *"The rivers and tributaries in the California portion of this ESU were estimated to have average recent runs of 7,080 natural spawners and 17,156 hatchery returns, with 4,480 identified as "native" fish occurring in tributaries having little history of supplementation with non-native fish. Combining recent run-size estimates for the California portion of this ESU with Rogue River estimates provides a rough minimum run-size estimate for the entire ESU of about 10,000 natural fish and 20,000 hatchery fish."*

Recent weir counts and spawning escapement estimates (1977-2001) for SONCC ESU coho salmon to the upper Trinity River have ranged from 59,079 in 1987 to 852 in 1994, averaging 15,942 (CDFG 2002c). Nearly two-thirds of these fish are estimated to spawn naturally, although the majority of all returning adult coho salmon to the Trinity River are thought to be of hatchery origin, which contributes to their threatened status (NMFS 1997; CDFG 2002c). But, while these large swings in numbers of returning hatchery adults have been occurring, the numbers of coho salmon of natural origin are thought to have continued to decline (USFWS & HVT 1999). Recent capture of coho salmon smolts in the upper Trinity River has confirmed poor natural production with only 3 percent of individuals observed not evidently of hatchery origin (Glase 1994). The current population estimate of wild coho salmon in the Trinity River is about 200 individuals (USFWS & HVT 1999). However, recent counts and other population indices, since 2000, have indicated that SONCC ESU coho are experiencing a moderate increase in abundance and their distribution among streams in California has remained stable (CDFG 2000b).

5.2 Factors Affecting Trinity River Coho Salmon and Other Anadromous Fishes (Environmental Baseline)

Factors affecting the life cycle, productivity, and persistence of coho salmon populations are numerous and varied. Weitkamp et al. (1995), NMFS (1997), NMFS (1999), USFWS & HVT (1999), TRMFR 2000 ROD, and CDFG (2002b) have previously described the factors thought to contribute to the current population status of coho salmon coast-wide and in the Trinity River. NMFS's 2000 Biological Opinion on the TRMFR DEIS listed five principal factors are associated with the declines of SONCC ESU coho salmon: (1) dam construction and culvert installation that can block previously available habitat; (2) water development activities that can affect water quantity, timing, and quality; (3) land use activities such as logging and mining that can degrade aquatic habitat; (4) hatchery operation and practices; and, (5) harvest activities. A sixth factor currently

designed to affect coho populations in a beneficial manner is implementation of habitat restoration and salmon recovery programs, such as the TRRP in the Trinity basin and the Klamath River Basin Fisheries Restoration Program. For the purposes of this BA/EFHA, factors thought to specifically affect the Trinity River population of SONCC ESU coho salmon and other anadromous salmonids are excerpted and summarized from the above sources.

5.2.1 HABITAT BLOCKAGE

Impassable dams in northern California have blocked substantial portions of suitable spawning and rearing habitat for salmon and steelhead. These include Copco Dam (and Iron Gate Dam) on the Klamath River, and the Trinity River Diversion (TRD) on the Trinity River, including Lewiston and Trinity dams. Numerous other minor blockages and fish passage impairments exist due to road culvert designs and water management activities. Blockage of previously available suitable habitat can reduce salmon production. In some cases, decreases in available habitat (and resulting fish production) can decrease population resiliency to fluctuations due to other causes, including stochastic climatic and oceanic events (Moyle et al. 1995). The TRD blocked access to an estimated 109 miles of spawning and rearing habitat for anadromous fish (TRMFR DEIS 2000). The portion of this previously available habitat that was used by coho salmon is uncertain. However, much of the now blocked habitat is considered to have been prime spawning and rearing habitat (USFWS & HVT 1999). Anadromous fish have been restricted to the river and tributary habitats below the TRD for over 40 years. The mainstem river habitat has degraded since TRD operation began as a result of reduced flows and altered physical habitat (USFWS & HVT 1999). As early as 1980, overall decline in spawning habitat was estimated at 80-90 percent (USFWS 1980). Of the habitat remaining, much of it was comprised of monotypic "runs" with high velocities, which is not preferred for spawning by any of the salmonid species (NMFS 1999).

5.2.2 WATER DEVELOPMENT ACTIVITIES

Development of surface water supplies for agricultural, residential, municipal, and mining and other industrial uses has altered natural hydrologic cycles in the Klamath and Trinity basins. In some tributaries of the Klamath and Trinity rivers, dewatering of stream reaches may occur due to diversions for irrigation and municipal use.

Alteration of stream flows may affect anadromous salmonid populations through a variety of mechanisms. Adult and juvenile migration may be delayed by insufficient flows or habitat blockages caused by dams and weirs or dewatered stream sections. Reduced stream flow, stream dewatering, and blockage may restrict the amount of sufficient suitable habitat to maintain fish populations. Altered flow regimes can affect seasonal water temperatures resulting in changes in growth, migration timing, predation and competition interactions among species, and direct mortality if temperature extremes exceed fishes physiological tolerances. Juvenile salmon can be stranded in isolated pools and pocket water by rapid flow fluctuations, making them vulnerable to predation and dessication. Juvenile salmon may be entrained into unscreened diversion or at diversion with poorly designed fish screens. In addition to these factors, reduced flows negatively impact fish habitats due to increased deposition of fine sediments into spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas resulting in reduced available habitat, as has occurred in the mainstem Trinity River.

5.2.3 LAND USE ACTIVITIES

Land use activities associated with logging, road construction, urban development, mining, and agriculture have significantly altered fish habitat quantity and quality, and have certainly contributed to the current status of coho and chinook salmon stocks in the Trinity River and greater Klamath River Basin. Timber harvesting and associated road building have occurred in many areas in the Klamath and Trinity basins. Activities associated with logging have resulted in habitat simplification of stream channels through sedimentation, channelization, and loss of riparian vegetation, large woody debris, and habitat complexity. Logging has reduced the amount of instream, large woody debris, resulting in significant impacts to salmonid habitat. Certain logging practices and large floods in 1955 and 1964, combined to cause vast landslides, debris flows, and sedimentation, that damaged anadromous fish habitat throughout much of the Klamath-Trinity basins and other regions inhabited by the SONCC ESU coho salmon (California Resources Agency 1970, FEMAT 1993). Timber harvesting and lumbering operations, while considerably reduced from levels that occurred as recently as the early 1990's, remain a significant and viable part of the economy of Trinity County and northern California.

The discovery of gold in California in the 1860s resulted in intensive mining throughout the northern portion of this region. The Klamath and Trinity Basins were the sites of active mining, and suction dredging, placer mining, and gravel mining continues to the present day. Lode mining for gold, copper and chromite continued as recently as 1987. Hydraulic mining for gold resulted in millions of cubic yards of colluvial material washed from the hillslopes down into tributary streams and the mainstem Trinity River during the mining era. Large tailings piles remain along vast tracts of the Trinity River's flood plain. The effects of mining activity on anadromous fish ranged, from stream blockage and dewatering for hydraulic mining, to the destructive sedimentation of rearing pools and spawning grounds. Population reductions of anadromous fish from historic levels of up to one-third have been attributed to mining in the Klamath-Trinity Basin (Kier and Associates 1991).

Excessive sedimentation and unstable spawning gravels, caused by a variety of land use practices, have historically been major habitat problems in the Klamath-Trinity basin. The legacy of the catastrophic 1955 and 1964 flood and land wasting events continue to affect aquatic habitat conditions throughout the region. However, considerable progress to reverse the impacts of previous poor land use management throughout the region is currently being made. Improved land use management practices as they affect fish and wildlife habitat and water quality are being implemented on federal, state, municipal, and private lands through a variety of efforts, such as the federal Aquatic Conservation Strategy (FEMAT 1993), revisions to the California Forest Practices Rules, and the Five Counties Salmon Conservation Program (funded by the California SB1087 "Salmon and Steelhead Trout Restoration Account"). Trinity County has participated in a leadership role in the preparation of a fish habitat and water quality protection guidance manual for use by road maintenance departments throughout five county north coast California area.

5.2.4 HATCHERY OPERATION AND PRACTICES

Hatchery production of coho salmon in the Klamath-Trinity Basin occurs at Iron Gate (IGH) and Trinity River (TRH) hatcheries. The IGH began operating in 1965 and TRH began operating in 1958. IGH has an annual production goal of 75,000 yearling coho smolts to be released at the hatchery and

TRH has an annual production goal of 500,000 yearling smolts, the most of any California coho salmon hatchery (CDFG 2002b). Currently, both hatcheries regularly meet or exceed this production goal. Annual spawning adult coho returns to IGH have ranged from <100 to over 2000, but generally range from 500 to 1,500 (CDFG 2002b). Returning coho spawners at TRH have ranged from <100 to over 20,000, but typically range between 1,000 and 5,000 (CDFG 2002b). Over the years, both IGH and TRH have imported stocks from other hatcheries and other coho salmon ESU's.

In the Trinity River, the vast majority (≥ 90-percent) of the coho salmon run consists of fish with recent hatchery heritage (TRMFR DEIS 2000; CDFG 2002b, 2002c). A large proportion of naturally spawning coho in the Trinity River, 85% to 95% for 1997 to 2001, are known to be of recent hatchery origin (CDFG 2002b). A concern exists that competition may occur among hatchery and native adults for spawning sites, and may lead to decreased production, especially for wild coho salmon. Hatchery fish may outnumber wild fish and monopolize available spawning habitat when wild stocks are small and hatchery supplementation occurs. The negative effect of such competition can be magnified by naturally spawning hatchery stocks having lower spawning success than do wild fish. Hatchery stocks may also produce fewer smolts and returning adults. The extent to which competition between hatchery and wild coho has occurred in the mainstem of the Klamath and Trinity rivers is unknown. However, the persistent low number of wild coho returning to the Trinity is consistent with the hypothesis that competition between wild and hatchery fish may be suppressing increases of the wild population. In recent years, all hatcheries in California have stopped all stock transfers, limited outplanting (all TRH coho smolts are released volitionally at the hatchery), marked outplants, and placed limits on production levels. Therefore, the current level of impact of hatchery fish on wild fish may be significantly less than in the past (CDFG 2002b). Because natural production of coho salmon in the Trinity River appears to be very low, Trinity River Hatchery will likely play an important role in the recovery of SONCC ESU coho stocks (NMFS 1997; CDFG & NMFS 2001).

5.2.5 HARVEST

Historically, salmon and steelhead were an abundant resource that supported substantial commercial, sport, and tribal fisheries, contributing millions of dollars to numerous local economies. Over-fishing in the early days of the European settlement led to the depletion of many stocks of salmon and steelhead even before extensive habitat degradation. Prior to the 1900s, canneries were established near the mouth of the Klamath River. At the peak of harvest in 1912, an estimate of 141,000 salmon were harvested and canned. In 1915, only 72,400 chinook salmon were harvested and canned. By the early 1900s, over-harvest had reduced the dominant spring-run chinook salmon to low levels, making the fall-run chinook the dominant run in the basin. The numbers of coho salmon in these harvests are less certain but are considered to have been a minor component of the catch (Snyder 1931).

Over-fishing is believed to have been a significant factor in the decline of coho salmon. This included significant over-fishing that occurred from the time marine survival turned poor for many stocks (ca. 1976) until the mid-1990s when harvest was substantially curtailed. Since the 1994 season, retention of coho salmon has been prohibited in marine fisheries south of Cape Falcon, Oregon. Coho salmon are still impacted, however, as a result of hook-and-release mortality in chinook salmon-directed fisheries. Since 1970, the ocean exploitation rate index on Oregon

Production Index (OPI) coho salmon stocks (including coho salmon ESUs listed under the ESA) has generally declined from a high of about 80 percent to less than 10 percent in recent years. This has resulted from implementing non-retention fisheries off the Oregon and California coasts. Sport and commercial fishing restrictions ranging from severe curtailment to complete closures in recent years may be providing an increase in adult coho salmon spawners in some streams, but trends cannot be established from the existing data.

Trinity River coho salmon have historically been generally caught in ocean fisheries primarily off California. Coded-wire tagged coho salmon released from hatcheries south of Cape Blanco have a southerly recovery pattern, primarily in California (65-92%), with some recoveries in Oregon (7-34%), and almost none (1%) in Washington or British Columbia (percent data represent range of recoveries for five hatcheries by state or province). Ocean exploitation rates for SONCC ESU coho salmon are based on the exploitation rate on Rogue/Klamath hatchery stocks and have only recently become available. The estimated ocean exploitation rates were 5 percent in 1996 and 1997, 12 percent in 1998, and were projected to be 5 percent in 1999 (PFMC 1997, 1998, 1999 as cited in the 2000 Biological Opinion on the TRMFR DEIS). The extent to which coded-wire tagged recovery patterns of these hatchery stocks coincide with the distribution patterns of wild coho salmon is not known.

The annual tribal harvest of coho salmon in the Klamath-Trinity Basin from 1992 to 2000 ranged from 27 in 1993 to 1,168 in 1993, and in 2000 it was 91. Weitkamp et al. (1995), estimated the tribal impact on listed coho salmon has been relatively small, averaging 5-percent from 1992-1997.

5.2.6 Trinity River Diversion

In 1955, Congress authorized the construction of the Trinity River Division (TRD) of the CVP (Public Law (P.L.) 84-386) to divert surplus water to the Sacramento River. This activity was not intended to have detrimental affects to the fishery resources within the Trinity River. An average of 88-percent of the annual flow was diverted to the Sacramento River for the first ten years of TRD operation. Minimum flows released into the Trinity River ranged from 150 cfs to 250 cfs with a total volume of 120.5 taf. The minimum flow releases were focused primarily on chinook salmon spawning requirements and did not address fluvial geomorphic processes and the requirements of other fish species or life stages (USFWS & HVT 1999).

Within a decade of completion of the TRD, salmonid populations had noticeably decreased (Hubble 1973 as cited in USFWS & HVT 1999). Declines in the fishery resources lead to the formation of the Trinity River Basin Fish and Wildlife Task Force in 1974. In an attempt to stop the degradation of fish and wildlife habitat and to formulate a long-term management plan, the Task Force developed the Trinity River Basin Comprehensive Action program. In 1973, the CDFG requested that additional water be released to the Trinity River to stop the decline of salmon and steelhead. A three year attempt to evaluate varied flows on salmon and steelhead populations was hampered by flood and drought with no formal evaluation completed.

A USFWS study in 1978 concluded that substantial gains could be made for all life stages of anadromous fish from higher flows. The study also concluded that a volume of 340,000 af of water, after implementation of the stream restoration plan, would be necessary and result in tradeoffs

between habitats available for various fish life history stages (USFWS 1980). An EIS was prepared in 1980 to address the proposal to restore the salmon and steelhead populations by increasing the streamflow in the Trinity River (USFWS 1980). The EIS determined declines of 80 percent to chinook salmon and 60 percent to steelhead and an overall decline of 80 percent of the habitat. Factors identified for the decline in the fishery resource included insufficient streamflow, streambed sedimentation, and inadequate regulation of harvest.

Congress passed P. L. 96-335 in 1980 to control the degraded watershed of Grass Valley Creek, a tributary to the Trinity River. Construction of Buckhorn Debris dam in the Grass Valley Creek watershed and dredging of the Trinity River in select locations from Lewiston to the North Fork Trinity River was authorized to control sedimentation within the Trinity River.

In 1981, the Secretary of Interior, Cecil Andrus, issued a directive to the USFWS to conduct the 12 year flow study to determine: (1) the effectiveness of flow restoration, and other measures including intensive stream and watershed management; (2) the adequacy of the 340,000 af flow regime; (3) mitigation measures for impacts of the TRD; and (4) flow regimes and other measures appropriate to maintain instream habitat conditions. The Secretary's decision included increasing the flow releases in critically dry years to 140,000 af, in dry years to 220,000 af, and 340,000 af in normal or wet years.

In 1984, the Trinity River Basin Fish and Wildlife Management Act was passed (P.L. 98-541). A complete description of associated actions can be found in the 2000 TRMFR DEIS, Appendix B, Table B-1. In 1986, Congress enacted the Klamath River Conservation Restoration Area Act (P.L. 99-552). Two groups were formed under P.L. 99-552, the Klamath Fishery Management Council and the Klamath River Basin Fisheries Task Force.

In 1990, the North Coast Regional Water Quality Control Board concluded that the operations of the TRD impacted spawning and egg incubation within the Trinity River. Subsequently in 1991, temperature control objectives were set from Lewiston to Douglas City (60 °F from July 1 to September 14, and 56 °F from September 15 to September 30) and from Lewiston to the confluence of the North Fork Trinity River (56 °F from October 1 to December 31) (NCRWQCB 1994). Additionally in 1991, an administrative appeal by the Hoopa Valley Tribe resulted in a Secretarial decision (May 8, 1991) to increase Trinity River water releases during the 1992-1996 period to no less than 340,000 af in all years and established low flows of not less than 300 cfs.

The enactment of the Central Valley Project Improvement Act in 1992 (CVPIA, Title 34 of P.L. 102-575 - 3406(b) 23) restated the flow releases included in the 1991 Secretarial Decision, established a completion date for the TRFE study and a date for permanent fishery flow allocation, and established that the Hoopa Valley Tribe and the Secretary must agree with any change in flow. The Environmental Protection Agency (EPA) approved the Trinity River Temperature Objectives as Clean Water Act 303 water quality standards and found that water export to the Sacramento River was a controllable factor that could be modified to meet the water quality standards.

The USFWS halted efforts in 1993 on an Environmental Assessment/Environmental Impact Report for a Trinity River Anadromous Fish Habitat Improvement Plan, recognizing the need for a document with a more comprehensive scope. Recognizing that Buckhorn Debris Dam and sand dredging in the Trinity River were not adequate to permanently protect the Trinity River from massive discharges of

decomposing granite, P.L 98-541 and the Fiscal Year 1993 Energy and Water Appropriation Act (P.L. 102-377) authorized the purchase of 17,000 acres of the Grass Valley Creek Watershed by Congress. This land is now managed by BLM, with a primary focus on erosion control and watershed rehabilitation.

The TRFE study was completed in 1999 (USFWS & HVT 1999) and provided recommendations to the Secretary of Interior to fulfill fish and wildlife protection mandates of the preceding authorizing legislation. The TRFE study recommended a strategy to rehabilitate salmonid habitat through a management approach that integrated riverine processes and instream flow-dependent needs. This strategy consists of restoring processes that maintain the essential attributes of a dynamic alluvial river. The TRFE study identified the following management factors to implement the restoration strategy: 1) releasing increased annual instream flow volumes in conjunction with variable reservoir release schedules, 2) managing fine and coarse sediment supplies, 3) rehabilitating selected reaches of the mainstem channel, and 4) an adaptive environmental assessment and management program to "fine-tune" and guide the implementation of the restoration activities. The recommended annual water volumes for release to the Trinity River were: 368.6 taf (critically dry years), 452.6 taf (dry years), 646.9 taf (normal years), 701.0 taf (wet years), and 815.2 taf (extremely wet years).

The TRMFR DEIS for implementing the recommendations of the TRFE study was completed in 2000. NMFS issued a "no jeopardy" biological opinion, provided reasonable and prudent measures were implemented to limit harm, on the DEIS, and a ROD was issued to implement the program in December 2000. The flow recommendation included in the TRMFR ROD was immediately challenged in U.S. District Court, which resulted in an injunction of implementation of the recommended flow schedule. A Summary Judgment by the Court in December 2002 ruled that the flow schedule was "arbitrary", and issued an injunction to limit instream flow releases in the Trinity River to the 452.6 taf level (*Westlands Water District, San Luis & Delta-Mendota Water Authority, and San Benito Water Authority, et al.* v. *U.S. DOI, et al.*, CIV-F-00-7124 OWW DLB, U.S. District Court, Eastern District of California, 2002). In a recent Final Judgment in this case, the Court directed the Secretary of Interior to complete a re-evaluation of the TRMFR flow schedule in a SEIS to comply with NEPA by December 9, 2003 (*Westlands Water District, San Luis & Delta-Mendota Water Authority, and San Benito Water Authority, et al.* v. *U.S. DOI, et al.*, CIV-F-00-7124 OWW DLB, U.S. District Court, Eastern District of California, Final Judgment, February 20, 2003). Other fishery restoration components of the TRMFR ROD, including bank and channel rehabilitation projects, managing sediment supplies, and modifications to infrastructure (such as raising the four bridges subject to this BA/EFHA), were directed to proceed under the Court's ruling.

Section 6

EFFECTS

The determination of how the proposed action may affect the SONCC ESU coho salmon or its designated critical habitat is based on an analysis of the potential effects of the proposed project added to the environmental baseline, as described in Section 5 of this BA/EFH (50 CFR 402). Potential effects include beneficial effects, direct and indirect effects, together with the effects of interrelated and interdependent actions, and any reasonably certain future non-Federal activities in the action area (cumulative effects). The term "cumulative effects" has a narrower focus under ESA § 7 consultations than that under NEPA or other environmental laws (50 CFR 402). Although not required for the purposes of this BA/EFHA, future Federal actions, unrelated to the Proposed Action, requiring separate consultation, are generally considered in this cumulative effects analysis.

Construction of the proposed Trinity River Bridges Project has the potential to adversely affect the SONCC ESU coho salmon, including designated critical habitat for the species, and EFH for both coho and chinook salmon. The following discussion identifies those project activities that may adversely affect these species and identifies the conservation measures incorporated into the projects to reduce these impacts.

Effects to fishery resources are considered adverse if they result in any one of the following:

- Direct mortality of state-listed or federally listed fish species;
- Temporary impacts to habitats such that listed species suffer increased mortality or lowered reproductive success;
- Permanent loss of habitat critical to listed fish species;
- Substantial reductions in the size of a special-status fish species population; and
- Substantial reduction in the quantity or value of habitats, including essential fish habitat, in which special-status fish populations occur.

Potential effects of the proposed Trinity River Bridges Project are presented below by impact category. Analysis specific to a particular bridge location is emphasized when there are distinct differences.

6.1 Aquatic Habitat / Water Quality

6.1.1 Erosion and Sedimentation

Activities related to the construction of the new bridges, roadway improvements, and demolition and removal of existing bridges will result in the localized loss of vegetation and general disturbance to the soil. Removal of vegetation and soil can accelerate erosion processes within the project ESL's

and increase the potential for sediment to enter the Trinity River. The turbidity of a water body is related to the concentration of suspended solids. Aquatic organisms are generally not acutely affected by suspended solids and turbidity unless they reach extremely high levels (i.e., levels of suspended solids reaching 25 mg/L). At these high levels, suspended solids can adversely affect the physiology and behavior of aquatic organisms and may suppress photosynthetic activity at the base of food webs, impacting aquatic organisms either directly or indirectly (Alabaster and Lloyd 1980).

Sedimentation of in-stream gravels could significantly change the composition and abundance of aquatic invertebrate populations, thus impacting food availability for salmonids. Sedimentation of fines in cobble and gravel substrates would also reduce the amount of interstitial spacing between bed materials that provide a source cover for fry and juvenile salmonids. Potential sedimentation of river gravels may reduce the quality of suitable rearing and spawning habitats (Cordone and Kelley 1961).

The magnitude of potential impacts to the Trinity River resulting from the proposed action varies by bridge site. At Salt Flat, the single column bent will be constructed outside of the active low-flow channel, but it will require construction of a temporary wet ford crossing through the left side-channel, to provide access to the mid channel bar, and a gravel work platform for installing the bent (see **Figure 3**). Approximately, 450 ft^2 of side-channel habitat will be temporarily impacted (duration=approximately 1 year) during construction by the addition of a gravel base and steel landing mat and occasional equipment crossing (20 to 40 times through construction). Removal of the temporary crossing after construction will restore the side-channel habitat. These activities will likely stir up streambed sediments but are not likely to add silt material to the river. The effects will be localized and temporary (i.e., on the order of 0.5 hour during gravel placement and several minutes during vehicle crossings). Use of washed, spawning-sized gravels and the cleaning of vehicle wheels prior to crossing the side-channel will minimize the effects of this action on fish habitat. Any juvenile salmonids rearing in the area during gravel placement or vehicle crossings may be temporarily displaced or their social behavior may be temporarily disrupted by turbidity created during this activity. Behavioral disruption, even temporarily, could result in some increased vulnerability to competitive interactions or predation for juvenile coho salmon (Berg and Northcote 1985).

Also at Salt Flat, construction of the right abutment engineered fill and rip-rap slope will require work within the channel near the right bank, extending below the stream channel about six feet. Approximately 100 linear feet of deep run habitat, out to a distance of 20-feet from the low flow right bank, will be altered. Streambed silt will be mobilized during in-water excavation of the slope toe and placement of rip-rap. This effect will be localized and temporary (in-water excavation and rip-rap placement is estimated to require a maximum of 10 days). The turbidity and silt effects will decline downstream of the site as silt re-settles and dissipates through the water column. Some silt may settle near or on known spawning habitat located about 200-feet downstream and across the main river channel from the bridge site (see **Figure 8**), but is not expected to significantly impair redd excavation or spawning by coho salmon. Completing in-water excavation at this site by October 15th in the first year of construction will avoid coho salmon spawning which typically commences during November. However, a small number of adult coho salmon migrants may be expected in the project area by mid-October, and pulses of turbidity and in-water work may locally and temporarily affect upstream migration. This is not expected to result in significant effects on migration timing or subsequent spawning. Any juvenile salmon rearing in the area during gravel placement or vehicle

crossings may be temporarily displaced or their social behavior may be temporarily disrupted by turbidity created during this activity. Behavioral disruption, even temporarily, could result in some increased vulnerability to competitive interactions or predation for juvenile coho salmon (Berg and Northcote 1985).

Because the existing bridge at Bucktail will remain in place, and no construction activities will occur in or near the active low-flow channel, no sedimentation effects in the main river channel are expected for this site.

The proposed bridge abutments for the Poker Bar Bridges will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor the ability to access and install supports without encroaching upon the active river channel and is expected to avoid causing sedimentation, along with implementation of associated conservation measures.

At the Biggers Road Bridge site, the proposed action requires a single column bent to be constructed just outside the low-flow active channel and a temporary gravel fill ramp and work platform to be constructed to provide access for installation of dowels, formwork, reinforcement, and concrete. Work proposed to occur on the left abutment and bent adjacent to the low-flow channel during the fall months, after September 15th of the first year of construction, increases the risk of sediment runoff from the site during storm events. Implementation of conservation measures and BMP's for controlling erosion at this site during construction is expected to avoid or minimize sediment runoff.

Demolition of the existing bridges at Salt Flat, Poker Bar, and Bigger's Road will result in localized and temporary disturbance of streambed silt and stream bank soils due to activities associated with removal of mid-channel piers and bank side bridge abutments. Incorporation of conservation measures to control erosion and sedimentation should limit the amount of soil erosion and sedimentation associated with demolition activities. Stream banks will be stabilized and restored with riparian vegetation after existing bridge abutments have been removed.

At Salt Flat and Bigger's Road sites, streambed silt will likely be stirred up during placement of temporary gravel ramps in the river channel for access to and removal of mid-channel piers. These ramps will be in place for 5 to 10 days during pier removal and then contoured to the streambed after work is completed. Silt disturbance, turbidity, and any sedimentation of the streambed associated with these activities are expected to be localized and temporary. Some silt may settle near or on known spawning habitats located downstream of each of these sites, but is not expected to impair redd excavation or spawning. All demolition work will be performed during June 15th and September 15th to avoid effects on adult coho migration and spawning, and smolt emigration, as well as spawning by other salmon species. Any juvenile salmon rearing in the area during gravel placement or vehicle crossings may be temporarily displaced or their social behavior may be temporarily disrupted by turbidity created during this activity. Behavioral disruption, even temporarily, could result in some increased vulnerability to competitive interactions or predation for juvenile coho salmon (Berg and Northcote 1985).

6.1.2 Accidental Spills

Construction activities typically include the refueling of construction equipment on location. As a result, minor fuel and oil spills may occur, with a risk of larger releases. Without rapid containment and clean-up, these materials could be potentially toxic depending on the location of the spill in proximity to surface water features, including the Trinity River. Oils, fuels, and other contaminants could have deleterious effects on all salmonid life stages present within close proximity to construction activities. Conservation measures incorporated into the project will avoid or minimize these potential risks.

6.2 Affects on Potential Spawning and Rearing Habitat

No permanent adverse effects on spawning habitat are expected at any of the bridge sites since all abutments and bents will be located outside the active low flow channel, except at Salt Flat where slope protection will extend into the deep run in the low flow channel; however, there is no suitable spawning habitat within this run. Temporary effects on spawning habitats near Salt Flat, Poker Bar, and Bigger's Road sites associated with bridge construction and demolition are expected to be limited to short-term, localized sedimentation caused by re-settling of silt disturbed by in-water work activities. Salmonid use of these sites for redd-building and spawning is not expected to be impaired. Sediment runoff will be avoided or minimized by incorporation of conservation measures to control erosion and sedimentation. Spawning-sized gravels will be used at the Salt Flat and Bigger's Road sites for fill to create a temporary crossing at the Salt Flat side-channel and in the main channel for temporary access ramps to remove existing piers at both sites. These gravel fills will be graded to existing streambed and bank contours after the work is complete. These bridge sites are near documented spawning areas so under high river flows these graded fill gravels may mobilize and augment spawning areas on downstream riffles. Additionally, in-water work would be performed from June 15th to September 15th, or to October 15th during the first year, which is outside the spawning season for coho salmon in the Trinity River.

Suitable rearing habitat for juvenile coho salmon and other salmonids occurs within the ESL's at each of the bridge sites. Permanent, direct effects on physical rearing habitat from construction of the new bridges would not occur at Bucktail, Poker Bar, or Biggers Road bridges, since all work on abutments and bents at these sites would occur outside the low flow channel. At Salt Flat, work on the mid-channel bar bent requires building a temporary gravel fill crossing in the left side-channel that will directly affect coho rearing habitat. Rip-rap slope protection on the right bank at Salt Flat will extend beneath the low flow channel water surface and streambed resulting in a permanent alteration to juvenile coho rearing habitat. The extent of this habitat alteration is limited to about 100 lineal feet of run habitat adjacent to the right bank. Rip-rap has been shown to be, in general, a less suitable rearing habitat for chinook salmon compared to natural stream banks and their associated SRA habitat values (Michney and Hampton 1984; Michney and Deibel 1986). The applicability of this finding to coho salmon could not be confirmed; however, SRA habitat and LWD were found to play a major role in habitat preferences of both fry and juvenile coho salmon in the Trinity River (Hampton 1988).

6.3 Loss of Shaded Riverine Aquatic (SRA) Habitat

Removal of montane riparian vegetation along the banks of the Trinity River could adversely impact the quality of rearing habitats used by salmonids. Riparian vegetation is important to the maintenance of healthy fish habitat. Riparian areas provide shade and temperature benefits, sediment, nutrient and chemical regulation, stream bank stability, and inputs of large woody debris and organic matter to the channel. Riparian vegetation that is adjacent to the river, a component of SRA habitat, is included as an element of designated critical habitat for SONCC ESU coho salmon.

Construction activities associated with the proposed Trinity River Bridges Project would result in impacts to SRA habitat. **Table 6-1** summarizes impacts to riparian wetland vegetation that contributes to SRA habitat by bridge site. Construction impacts to riparian wetland habitat, occurring as montane riparian vegetation stringers located on either side of the Trinity River, will permanently affect only 0.083-acres, and temporarily affect an additional 0.707 acres.

TABLE 6-1
SUMMARY OF SHADED RIVERINE AQUATIC (SRA) HABITAT IMPACTS BY BRIDGE SITE

	Salt Flat Bridge	Bucktail Bridge	Poker Bar Bridge	Bigger's Road Bridge
Riparian wetland acres **permanently** impacted by proposed action (**Total=0.083 acres**)	0.022	0	0.055	0.006
Riparian wetland acres **temporarily** impacted by proposed action (**Total=0.707 acres**)	0.271	0.081	0.15	0.205

Since the existing bridge structures and approaches would be used as the construction detours, temporary construction impacts will be minimized and limited to the area upstream or downstream (depending on the specific action) of the existing bridges. The proposed Salt Flat Bridge will require temporary construction access above the active low flow channel, across the left side-channel, and on the right bank below the low flow water surface. Impacts in and along the side-channel habitat will be temporary and restored after construction, however, permanent alteration of riverine and riparian habitat along the right bank in the Salt Flat ESL by rip-rap will be unavoidable. The proposed roadway improvements at the Bucktail Bridge site will require a temporary construction detour to be constructed within the active floodplain, but will not result in the permanent loss of riverine or SRA habitat. The proposed Poker Bar Bridge will place bridge supports outside of the low-flow active channel; as a result, no permanent loss of riverine habitat will occur because of the project. Finally, the proposed Biggers Road Bridge will place both bridge abutments and one bent outside the low-flow active channel, and will not result in loss of riverine habitat. Only small amounts of riparian wetland will be permanently affected at these latter two sites.

Removal of the existing bridge at Salt Flat would allow for restoration of a majority of the acreage of riparian habitat, (i.e., mixture of willows, alders, and cottonwoods), estimated as being lost to the new bridge and alignment. Loss of riparian habitat to the right bank slope protection rip-rapping at Salt Flat would be replaced by inter-planting the rip-rap with riparian plants. Also, removal of the existing bridge structures at the Biggers Road and Poker Bar Bridge sites would allow for restoration of similar acreages of riparian habitat affected by the new bridges. By implementing the riparian habitat mitigation incorporated into the Proposed Action through the previously described

conservation measures, no permanent net loss of SRA features would occur as a result of bridge replacements. There should be no loss of SRA habitat at the Bucktail site due to construction activities there.

6.4 Impaired Fish Passage

The four bridges have varying ability to accommodate the 100-year storm event or flow releases from Lewiston dam greater than 6,000 cfs (combined with tributary inflows) without sustaining damage and/or creating a hazardous situation for users. Therefore, the TRRP, Reclamation, BLM, and the County are proposing to replace the existing structures and/or upgrade existing roadways in order to improve the existing hydraulic conditions and allow for adequate conveyance of flood flows. These hydraulic improvements would not be expected to impact fish passage.

Construction activities associated with the proposed project will require permanent placement of one support bent at the Salt Flat and Biggers Road bridge sites. However, the existing Salt Flat and Biggers Road bridges are four-span structures, with three piers located within, or immediately adjacent to, the low-flow channel. Construction of the new two-span bridge structures (i.e., one support) combined with removal of the old bridges and piers will result in a net increase of riverine habitat and will improve fish passage, by reducing channel constrictions and localized hydraulic velocity increases. Bridge replacement and roadway improvement activities at the remaining two sites will not require placement of permanent structures within the ordinary high water line of the Trinity River.

At the Salt Flat site, construction of the temporary wet ford crossing in the left side-channel will maintain adequate depth and velocity conditions to allow fish passage, and to minimize impacts to aquatic organisms and domestic and agricultural water supplies. Also, at Salt Flat, work on the right bank abutment is projected to require in-water excavation until October 15th during the first year of construction, which will create temporary and localized disturbance of silt and turbidity in the river channel. A small number of adult coho salmon migrants may be expected in the project area by mid-October, and pulses of turbidity and in-water work may locally and temporarily affect upstream migration. However, the river channel is sufficiently wide at Salt Flat to allow fish passing the site to avoid the in-channel work area. Construction of temporary gravel fill work ramps at Salt Flat and Bigger's Road sites for removal of existing bridge piers will not extend across more than one-third of the channel width, and are expected to be in place for no more than 10 days. This in-channel work associated with bridge demolition would be completed in one season between June 15th and September 15th, which would avoid effects on adult and juvenile coho salmon migrations. Based on these factors, the proposed project would potentially result in only minor temporary effects on adult coho salmon passage at the Salt Flat site. Ultimately, improved hydraulic channel conditions resulting from bridge replacement and removal of existing bridge piers would have a net beneficial effect on fish passage at these sites, especially during high river flows.

6.5 Mortality of Rearing Salmonids During Construction

As previously discussed, coho salmon are known to occur throughout the Trinity River. Suitable coho salmon rearing habitat exists within the ESL's for all the bridge sites and juvenile coho rearing is documented to occur at each of the sites, except for at Biggers Road Bridge. Most in-stream

construction activities are proposed to occur between June 15th and September 15th, except at Salt Flat where in-channel excavation will be required during the first year until October 15th. Direct mortality of emigrating coho smolts would be avoided, since outmigration occurs from February through mid-June in the Trinity River. However, young-of-year coho may be expected to rear throughout the river during the construction window. Some adult coho migrants may be expected in the project reach by mid-October. In-stream construction and demolition activities would take place at the Salt Flat and Bigger's Road sites. Bridge removal will be done in such a way as to prevent spans and associated materials from falling into the active channel. Bridge pier removal would be performed in a manner that limits the amount of material falling into the river and that subsequently needs to be removed. This in-stream work incorporates mitigation measures to alert and scare adult and juvenile salmonids from the work area to prevent or minimize direct injury and mortality of fish.

Suitable holding pools and runs exist within the Salt Flat, Bucktail, and Poker Bar project sites. Although coho salmon would not be expected during the June 15th to September 15th (or October 15th, in the first year) construction window, spring chinook salmon migrate through, over-summer, and stage in these habitats prior to spawning during this season. Conservation measures to avoid and minimize disturbances to these fish and habitats are similar to those described above.

6.6 Disturbance to Coho and Chinook Salmon Essential Fish Habitat

As previously discussed in this document, EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". The parameters defined for EFH assessments have been satisfied by the evaluation previously provided in this document (i.e., loss of SRA habitat, increased turbidity and suspended sediment, accidental spills, effects on spawning and rearing habitat, impaired fish passage, mortality of rearing salmonids).

6.7 Cumulative Effects

Cumulative effects are those impacts of future state, local, private, and tribal actions affecting endangered and threatened species that are reasonably certain to occur in the action area considered in this BA/EFHA. For purposes of this BA/EFHA, the action area includes the project ESL's previously described and the adjacent areas of the Trinity River that may potentially be directly or indirectly affected. Other activities within the Trinity River watershed have the potential to impact salmonids and designated critical habitat within the project region. Future projects that result in a federal action and will be subject to the FESA Section 7 consultation requirements are also briefly described, including the interrelated and interdependent actions prescribed by the TRFE study and adopted in the 2000 ROD.

Logging continues to be conducted primarily on private lands throughout the tributaries of the Trinity River except Canyon Creek (BLM 1995). The TRD continues to divert and export an average 800 taf to 1 maf to the Central Valley Project. Mining occurs in the Trinity River mainstem and Canyon Creek as suction dredging, and in a few tributary watersheds as placer mining. Mining can have a negative impact on fishery resources if conducted in the wrong location or at the wrong time of year. As the population of Trinity County increases and new homes are constructed, road building for access is likely to occur. Roads can create erosion, sedimentation, and stream course diversions,

which can negatively impact ecological conditions in stream corridors and the species inhabiting them.

Current state fishery management practices regulate sport and commercial fisheries for coho salmon by prohibiting in-river and ocean harvests in California waters within the range of SONCC ESU. Hatchery culture and release practices for coho salmon at Trinity River Hatchery have been reviewed and amended to reduce impacts on naturally produced fish and better serve in the recovery of SONCC ESU coho salmon (CDFG&NMFS 2001; CDFG 2002b).

Numerous watershed restoration projects are being planned and implemented throughout the Trinity River Basin. The Trinity County Resource Conservation District (TCRCD) and the Shasta-Trinity National Forest, in coordination with funding provided by the California Department of Fish and Game, are implementing numerous upslope watershed restoration projects throughout the Basin, primarily in the South Fork Trinity River watershed. The County, with grant funding provided by the California Department of Fish and Game (CDFG) and the State Water Resources Control Board (SWRCB), is inventorying all county road crossings on fish-bearing streams in the Trinity River Basin. It is anticipated that numerous restoration projects will occur based on these inventories. NEPA and CEQA review is being provided on a project-by-project basis by the appropriate agencies. Trinity County, TCRCD and CDFG all have the ability to be a CEQA lead agency for those projects. Either the Shasta-Trinity National Forest or the Six Rivers National Forest acts as the NEPA lead agency for projects on National Forest lands. BLM acts as NEPA lead agency for projects on BLM lands.

Implementation of Trinity River channel restoration and sediment management projects identified in the 2000 ROD are currently being evaluated through independent NEPA/CEQA processes, and will be subject to separate Section 7 consultations. Implementation of the instream flow release schedule approved by the 2000 ROD is enjoined by the Court until completion of a court-ordered supplemental EIS in compliance with NEPA by December 2003 (*Westlands Water District, San Luis & Delta-Mendota Water Authority, and San Benito Water Authority, et al.* v. *U.S. DOI, et al.*, CIV-F-00-7124 OWW DLB, U.S. District Court, Eastern District of California, Final Judgment, February 2003). The Court-ordered interim instream flows provide up to 453,000 af for fishery restoration purposes. The Proposed Action provides interrelated benefits for both sediment and flow management prescriptions for fish habitat restoration in the Trinity River. The increased hydraulic capacities and improved public safety during high river flows at the bridges resulting from the Proposed Action would benefit the efficacy of implementation of these important TRRP fishery restoration measures. The Proposed Action's increased bridge hydraulic capacities would better and more safely pass the prescribed river flow levels for alluvial sediment management and channel maintenance identified as required to restore salmonid fish habitat in the Trinity River (USFWS and HVT 1999).

Section 7

Analysis of Alternate Actions

7.1 Salt Flat Bridge

7.1.1 No-Action Alternative

Under the No-Action Alternative, Reclamation would not proceed with replacement of the existing Salt Flat Bridge across the Trinity River. Essentially, this alternative represents existing conditions. The existing bridge does not meet currently recommended design standards for water conveyance and debris clearance at the maximum prescribed flows, and the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed flows. Implementation of the No Action alternative could result in future public safety issues associated with an aging and deteriorating bridge structure as well as safety and property access issues associated with the bridge under flooded conditions.

Selection of the No Action alternative by Reclamation, BLM, and the County would result in no temporary or permanent construction-related impacts. However, the expected benefits of the proposed action would not be realized. The existing bridge does not currently meet recommended design standards for water conveyance and debris clearance at the most probable Q_{50} and Q_{100} floods, nor for the maximum prescribed channel maintenance flows (USFWS & HVT 1999; Omni-Means, LTD 2000). Under the No Action alternative, the wider flow area and associated reduced backwater elevations, water velocities, and scour depths associated with the proposed action would not be realized.

7.1.2 Alternative 1 (Replacement Upstream with a Two-Span Structure, Private Ownership)

The Alternative 1 bridge will be constructed at an angle to the existing bridge approximately 30 to 65 feet upstream of the existing left and right abutments, respectively. The right bridge abutment and approach will be located within lands administered by the BLM. The bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 280 feet long (two 140 foot spans), with an 18-foot clear roadway width, designed to carry HS20 loading. New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The proposed action requires raising the left road approach approximately 4 feet to provide sufficient hydraulic freeboard over the river.

The increased span length will provide a wider flow area under the bridge, reducing the backwater surface elevations and water velocities. This will result in a more natural condition than the existing constricted channel. The abutments and single column bent will support the superstructure and will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor to minimize activity within the active low-flow channel.

The single column bent will be constructed on the mid-channel bar above the active low-flow channel elevation. The contractor will be required to provide access to the mid channel bar by constructing a temporary crossing that provides a stable route for equipment and contractor personnel. The crossing will minimize impacts to beneficial uses, including aquatic organisms and domestic and agricultural water supplies. The temporary crossing will be constructed by placing and contouring spawning gravel in the channel to provide an adequate base for placement of steel landing mats (similar to temporary military runway matting). The mats will be placed approximately 1-foot below the low-flow water surface elevation and will extend up the channel banks to an elevation providing approximately 3 feet of freeboard above the low-flow water surface elevation. The mats will remain in place until removed during the subsequent in-channel construction season. The contractor will be limited to working in the active low-flow channel from June 15th to September 15th, or until October 15th during the first year of construction to fulfill the same schedule as for the Proposed Action. The bent will be a 3.5-foot diameter column anchored to bedrock in one 3.5-foot diameter drilled shaft. It will have a small "foot print," impacting the least amount of area, and will be relatively quick to install. It is estimated that a working platform with an area 35-foot wide by 50-foot long (+/- 1700 ft^2) will be needed for equipment setup, access for bent construction and crane operation. The working platform will be constructed using cut-and-fill methods with existing site materials and/or imported spawning gravels. Dump trucks and earthmoving equipment may be used to construct the mid-channel bar platform. Bent construction will be accomplished using standard equipment and procedures based on types of equipment available. The reinforced concrete abutments and wingwalls will be founded on drilled shafts anchored in bedrock.

The contractor will utilize the mid-channel bar platform for bent construction and for positioning a crane to lift the bridge superstructure in place. It is anticipated the superstructure will be placed in the fall season after the in-river construction period has ended. Side channel crossing to access the platform will be kept to a minimum and is anticipated to occur roughly 10 to 20 times for each construction component (i.e. bent and superstructure installation). Vehicles crossing the side channel may include: earthmoving equipment, crane(s) and trucks. The contractor will be required to clean vehicles prior to crossing the side channel. Staging areas for construction will be located immediately upstream or downstream of the existing left abutment or may be located upstream on the Bonk parcel approximately 200 feet upslope from the left abutment.

As with the Proposed Action, approximately 100 lineal feet of rip-rap bank protection extending into the low flow channel will be required on the right abutment.

All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. Make-up water pumped from the river will pass through a screen at the inlet with maximum ¼-inch openings and a maximum intake velocity of 0.8 feet-per-second. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts. Slope protection measures will be implemented at abutments and constructed slopes to provide erosion protection from high flows.

Demolition procedures would be similar to the Proposed Action. Demobilization procedures will include clean up of all construction debris, fine-grading and contouring to "blend" new grades to existing grades and revegetation where required by final design and/or permits.

Selection of Alternative 1 by Reclamation, BLM, and the County would result in similar temporary and permanent construction-related impacts to riparian, SRA, and riverine habitats as the Proposed Action. Most of the expected benefits of the Proposed Action would be met. This alternative will meet the recommended design standards for water conveyance and debris clearance at the maximum prescribed flows. The distinction between this alternative and the Proposed Action is:

- The placement of the right abutment, approximately 50 feet upstream from that described in the proposed action. This will result in a change in rip-rap location from the run and corner pool associated with the proposed action, shifting upstream to a shallow, swift run.

- The placement of the bent will be shifted upstream, and the temporary gravel work platform and access crossing will be upstream of the existing bridge.

7.1.3 Alternative 2 (Replacement Upstream with a Two-Span Structure, Public Ownership)

The Alternative 2 bridge will be constructed at an angle to the existing bridge approximately 30 to 65 feet upstream of the existing left and right abutments, respectively. The right bridge abutment and approach will be located within lands administered by the BLM. The bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 280 feet long (two 140 foot spans), with a 24-foot clear roadway width, designed to carry HS20 loading. New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The proposed action requires raising the left road approach approximately 4 feet to provide sufficient hydraulic freeboard over the river.

The increased span length will provide a wider flow area under the bridge, reducing the backwater surface elevations and water velocities. This will result in a more natural condition than the existing constricted channel. The abutments and single column bent will support the superstructure and will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor to minimize activity within the active low-flow channel.

The single column bent will be constructed on the mid-channel bar above the active low-flow channel elevation. The contractor will be required to provide access to the mid channel bar by constructing a temporary crossing that provides a stable route for equipment and contractor personnel. The crossing will minimize impacts to beneficial uses, including aquatic organisms and domestic and agricultural water supplies. The temporary crossing will be constructed by placing and contouring spawning gravel in the channel to provide an adequate base for placement of steel landing mats (similar to temporary military runway matting). The mats will be placed approximately 1-foot below the low-flow water surface elevation and will extend up the channel banks to an elevation providing approximately 3 feet of freeboard above the low-flow water surface elevation. The mats will remain in place until removed during the subsequent in-channel construction season. The contractor will be limited to working in the active low-flow channel from June 15th to September 15th, or until October 15th during the first year of construction to fulfill the same schedule as for the Proposed Action. The bent will be a 3.5-foot diameter column anchored to bedrock in one 3.5-foot diameter drilled shaft. It will have a small "foot print," impacting the least amount of area, and will be relatively quick to

install. It is estimated that a working platform with an area 35-foot wide by 50-foot long (+/- 1700 ft^2) will be needed for equipment setup, access for bent construction and crane operation. The working platform will be constructed using cut-and-fill methods with existing site materials and/or imported spawning gravels. Dump trucks and earthmoving equipment may be used to construct the mid-channel bar platform. Bent construction will be accomplished using standard equipment and procedures based on types of equipment available. The reinforced concrete abutments and wingwalls will be founded on drilled shafts anchored in bedrock.

The contractor will utilize the mid-channel bar platform for bent construction and for positioning a crane to lift the bridge superstructure in place. It is anticipated the superstructure will be placed in the fall season after the in-river construction period has ended. Side channel crossing to access the platform will be kept to a minimum and is anticipated to occur roughly 10 to 20 times for each construction component (i.e. bent and superstructure installation). Vehicles crossing the side channel may include: earthmoving equipment, crane(s) and trucks. The contractor will be required to clean vehicles prior to crossing the side channel. Staging areas for construction will be located immediately upstream or downstream of the existing left abutment or may be located upstream on the Bonk parcel approximately 200 feet upslope from the left abutment.

As with the Proposed Action, approximately 100 lineal feet of rip-rap bank protection extending into the low flow channel will be required on the right abutment. As with the Proposed Action, approximately 100 lineal feet of rip-rap bank protection extending into the low flow channel will be required on the right abutment.

All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. Make-up water pumped from the river will pass through a screen at the inlet with maximum ¼-inch openings and a maximum intake velocity of 0.8 feet-per-second. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts. Slope protection measures will be implemented at abutments and constructed slopes to provide erosion protection from high flows.

Demolition procedures would be similar to the Proposed Action. Demobilization procedures will include clean up of all construction debris, fine-grading and contouring to "blend" new grades to existing grades and revegetation where required by final design and/or permits.

Selection of Alternative 2 by Reclamation, BLM, and the County would result in some additional temporary and permanent construction-related impacts to riparian, SRA, and riverine habitats given the larger footprint for this alternative. Most of the expected benefits of the proposed action would be met. This alternative will meet the recommended design standards for water conveyance and debris clearance at the maximum prescribed flows. The distinction between this alternative and the Proposed Action is:

- The placement of the right abutment, approximately 50 feet upstream from that described in the Proposed Action. This will result in a change in rip-rap location from the run and corner pool associated with the proposed action, shifting upstream to a shallow, swift run.

- The placement of the bent will be shifted upstream, and the temporary gravel work platform and access crossing will be upstream of the existing bridge.

- Increased road width, and paving may result in a nominal increase in runoff to the river.

7.2 Bucktail Bridge

7.2.1 No-Action Alternative

Under the No-Action Alternative, Reclamation would not make any improvements or changes at the existing Bucktail Bridge site. Essentially, this alternative represents existing conditions. However, there would still be the probability of high flows and overtopping of the right approach road as realized during 1997 flooding, during which time, according to the hydraulic analysis, the water surface elevation near RM 105.14 may have been as high as elevation 1759.0 feet. In addition, an overtopped roadway would be unsafe for vehicles or pedestrians.

Selection of the No Action alternative by Reclamation, BLM, and the County would result in no temporary or permanent construction-related impacts. However, the expected benefits of the proposed action would not be realized. The existing floodway crossing (bypass) does not currently meet recommended design standards for water conveyance and debris clearance at the maximum prescribed flows (Omni-Means, LTD 2000). Under the No Action alternative, the enhanced conveyance of flood flows and associated reduced backwater elevations, water velocities, and scour depths at the Bucktail Bridge associated with the proposed action would not be realized.

7.2.2 Alternative 1 (Raise Existing Levee)

The Alternative 1 action for the Bucktail Bridge site consists of raising the existing levee on the right bank of the river upstream of the existing bridge. The existing "arc-shaped" levee extends upstream for approximately 450 lineal feet with an average top elevation of 1759.0 msl. This alternative proposes raising the levee to an elevation approximately 0.5 feet above the calculated water surface for the Q_{100} (spring with ROD) flow event. This design increases the height of approximately 200 lineal feet of the existing levee to an approximate elevation of 1759.5 msl, extends the length of the existing levee by 50 feet upstream, and fills in the existing "notch" in the levee. The notch was constructed for flood control purposes during a prior year flood event. Under this alternative, no modifications to Browns Mountain Road would be required. The modeled flows would be forced to pass under the bridge. No portion of the modeled flows would spill over the levee into the wetland area north of the road.

The existing bridge will provide about 1.0 feet of freeboard for Q_{100} (13,100 cfs) at the low chord, which is on the right abutment. The freeboard will be higher at the left abutment. For a flow of 15,000 cfs, the water surface elevation is approximately 0.1 feet below the low chord.

The nominally 12 foot wide levee (measured across the top) will be of typical construction using an earth core armored with rip-rap.

Selection of this alternative by Reclamation, BLM, and the County would result in a modification to the bed and/or bank on the right side of the Trinity River, upstream of the existing bridge. Some

temporary or permanent construction-related impacts may occur. The distinction between this alternative and the Proposed Action is:

- This alternative would reduce impacts to riparian features, mostly to an emergent wetland and seasonal wet meadow, in the vicinity of the existing floodway crossing compared to the Proposed Action. However, it would impact riparian vegetation on the right bank providing SRA habitat, which the Proposed Action would not.

- Additionally, this alternative would impact fry rearing habitat documented to exist near the right bank at this site (Gallagher 1999).

- The existing bridge currently just minimally meets recommended design standards for water conveyance and debris clearance at the most probable 50-year and 100-year floods, and for the maximum prescribed channel maintenance flows (USFWS & HVT 1999; Omni-Means, LTD 2000). Under this alternative, the confined flow area provided by levee construction will force high river flows under the bridge.

- Left bank erosion immediately downstream of the bridge may increase due to confinement of high river flows in the main channel.

7.3 Poker Bar Bridge

7.3.1 No –Action Alternative

Under the No-Action Alternative, Reclamation would not proceed with replacement of the existing Poker Bar Bridges across the Trinity River. Essentially, this alternative represents existing conditions. The existing bridges do not meet currently recommended design standards for water conveyance and debris clearance at the most probable Q_{50} and Q_{100} flood flows, nor for maximum prescribed channel maintenance flows. Additionally, the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed channel maintenance flows. Implementation of the No Action alternative could result in future public safety issues associated with aging and deteriorating bridge structures as well as safety and property access issues associated with the bridges under flooded conditions.

Selection of the No Action alternative by Reclamation, BLM, and the County would result in no temporary or permanent construction-related impacts. However, the expected benefits of the proposed action would not be realized. The existing bridges do not currently meet recommended design standards for water conveyance and debris clearance at the most probable Q_{50} and Q_{100} flood flows, nor for maximum prescribed channel maintenance flows (Omni-Means, LTD 2000). Under the No Action alternative, the wider flow area and associated reduced backwater elevations, water velocities, and scour depths associated with the proposed action would not be realized.

7.3.2 Alternative 1 (Replacement Downstream)

Under Alternative 1, the Poker Bar bridges will be constructed approximately 35 feet downstream of the existing bridges. The bridges will remain on private property, and will be the property of the Poker Bar Property Owners Association. The proposed bridge types are single span prefabricated

steel trusses with reinforced concrete deck, with an 18-foot clear roadway width, designed to carry HS20 live loading. The proposed bridges are 110 feet long over the left channel, and 80 feet long over the right channel. The prefabricated steel truss heights are 9 feet and 7.5 feet respectively. The bridge superstructure and guardrail will be fabricated with weathering steel. Weathering steel is high strength steel that develops a coating that protects it from corrosion and does not require painting or maintenance. The portion of road between the two bridges and the approaches will have an 18-foot clear roadway width, and it will be paved with asphalt concrete.

The longer spans will provide for a wider flow area under the bridges that will reduce the backwater elevation, and water velocities. The proposed bridge abutments are located outside of the low-flow active channel (Q = 450 feet^3/sec). This will allow the contractor the ability to access and install supports without encroaching upon the low-flow active channel.

Under this alternative, the Poker Bar bridge abutments will be founded on drilled shafts. Drilled shafts construction will be done using standard equipment and procedures (Contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutment wing walls will be reinforced earth with brick facade.

All material and water required for drilling and installing the drilled shafts will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. The left approach roadway will be raised approximately 10 feet and will have 2:1 side slopes. Slope protection will also be provided on both sides of the right approach roadway to protect the roadway embankment from flows that may overtop and may erode the road.

The road between the two bridges will be raised to elevation 1740.0 feet at the left bridge abutment 2 and transition to elevation 1734.0 feet at the right bridge abutment 1. Slope protection will also be provided on both sides of the road between the two bridges to protect the roadway embankment from flow that may overtop and may tend to wash away the road embankment.

Demolition procedures would be similar to the Proposed Action.

Selection of the Alternative 1 by Reclamation, BLM, and the County would result in similar temporary and permanent construction-related impacts to riparian and SRA habitat as the proposed action.

7.4 Biggers Road Bridge

7.4.1 No –Action Alternative

In addition to the proposed action, Reclamation is considering a "No Action" alternative in its evaluation of the project pursuant to the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). Under the No-Action Alternative, Reclamation would not proceed with replacement of the existing Biggers Road Bridge across the Trinity River. Essentially,

this alternative represents existing conditions. The existing bridge does not meet currently recommended design standards for water conveyance and debris clearance at the most probable Q_{50} and Q_{100} flood flows, nor the maximum prescribed channel maintenance flows (Omni-Means, LTD 2000). Additionally, the bridge foundations may be inadequate to withstand the scouring action of the maximum prescribed channel maintenance flows. Implementation of the No Action alternative could result in future public safety issues associated with an aging and deteriorating bridge structure as well as safety and property access issues associated with the bridge under flooded conditions.

Selection of the No Action alternative by Reclamation, BLM, and the County would result in no temporary or permanent construction-related impacts. However, the expected benefits of the proposed action would not be realized. The existing bridge does not currently meet recommended design standards for water conveyance and debris clearance at the maximum prescribed channel maintenance flows (Omni-Means, LTD 2000). Under the No Action alternative, the wider flow area and associated reduced backwater elevations, water velocities, and scour depths associated with the proposed action would not be realized.

7.4.2 Alternative 1 (Replacement Upstream with a Raised Two-Span Steel Truss Structure)

The Alternative 1 bridge will be constructed approximately 137 feet upstream and parallel to the existing bridge. The bridge will remain on private property, and will be the property of the Treadwell Subdivision Property Homeowners Association. The proposed bridge consists of a two-span prefabricated steel truss with reinforced concrete deck. The proposed bridge will be 230 feet long, with a 10 feet clear width, designed to carry HS20 live loading, and consisting of one 140 feet long and one 90 feet long spans. The prefabricated steel truss heights are 9 feet and 7 feet respectively. The bridge superstructure and guardrail will be fabricated with weathering steel. Weathering steel is high strength steel that develops a coating that protects it from corrosion and does not require painting or maintenance. Steel Bridge roadway profile or vertical alignment will need to be raised approximately 4 feet for the bridge to provide hydraulic freeboard over the Trinity River. Steel Bridge road approaches will be paved with asphalt concrete. A turnout area will be provided near the south end of abutment 1, parallel to Steel Bridge Road.

The longer spans will provide for a wider flow area under the bridge that will reduce the backwater elevation, and water velocities. The proposed bridge abutments and single column bent will support the bridge superstructure and are located outside of the low-flow active channel ($Q = 450$ ft^3/sec). This will allow the contractor the ability to access and install the supports without encroaching upon the low-flow active channel.

The Alternative 1 bridge requires a bent to be constructed outside the low-flow active channel. The contractor will be required to provide access to the bent location. This will require construction of a temporary working pad in a manner that provides a stable route for equipment and contractor personnel, and minimizes impacts to beneficial uses, including aquatic organisms, domestic and agricultural water supplies. To construct the temporary working platform, the contractor may use an excavator and a dozer. The contractor is limited to working in the low-flow active channel from June 15th to September 15th. However, work on the bent, within the zone between the low-flow channel

and ordinary high water level, would occur until October 15th during the first year to meet the same schedule as described for the Proposed Action.

The bent will be a single 3.5-foot by 7-foot column supported by a reinforced concrete footing, anchored to bedrock with drilled steel bar anchors. The bent has a small "foot print," impacts the least amount of area, and is relatively quick to install. It is estimated that a single working platform with an area 24-foot wide by 40-foot long (960 ft^2) will be needed for equipment setup and access for bent construction. Dump trucks may be used to transport material for construction of platform. Bent construction will be done using standard equipment and procedures (contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutments and wing walls will be reinforced concrete and/or reinforced earth structures.

All material and water required for drilling and installing the grouted dowels will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. Slope protection will also be provided on both sides of the left approach roadway to protect the roadway embankment from flows that may overtop and may erode the road. The left approach roadway will be raised approximately 4 feet, the right approach roadway will be raised approximately 3 feet and both roadway cross sections will have 2:1 side slopes.

Demolition procedures would be similar to the Proposed Action. Demobilization procedures will include clean up of all construction debris, fine-grading and contouring to "blend" new grades to existing grades and revegetation where required by final design and/or permits.

Selection of Alternative 1 by Reclamation, BLM, and the County would result in some additional temporary and permanent construction-related impacts to riparian and SRA habitats given work required to raise the Steel Bridge Road associated with this alternative. Most of the expected benefits of the Proposed Action would be met with this alternative. This alternative will meet the recommended design standards for water conveyance and debris clearance at the maximum prescribed flows. The distinction between this alternative and the Proposed Action is:

- Construction of roadway improvements, including several hundred feet of retaining wall adjacent to Steel Bridge Road. Retaining wall construction would result in significant removal of, and damage to, riparian areas adjacent to Steel Bridge Road and the bank of the Trinity River.

Section 8

Conclusion and Determination

It is determined that the proposed Trinity River Bridges Project "*is likely to adversely affect*" the following listed species:

- Federally-threatened SONCC ESU coho salmon (*Oncorhynchus kisutch*)

This conclusion is based on the following factors: 1) the projects will require some limited in-water construction during the first year of construction early in the adult coho migration season, which may result in temporary and localized effects on fish migration; 2) juvenile coho salmon are known to rear near each bridge project and in-stream construction and demolition work is required at all but one of the bridge sites, which may result in direct injury or temporary disruption of social behavior that may increase vulnerability to predation and competition; and 3) approximately 100 lineal feet of rearing habitat, within designated critical habitat will be altered by necessary rip-rap bridge abutment protection. However, these adverse effects are localized or temporary in nature and are more than compensated by the long-term benefits that would accrue through implementation of the Proposed Action. The benefits of the Proposed Action to listed the listed species includes: 1) new bridge designs reduce the number of bridge supports located within the ordinary high water channel increasing available riverine habitat, 2) removal of existing bridges will reduce channel constraints and increased hydraulic velocities that can impair fish passage during high river flows, 3) where in-stream work is proposed, mitigation and conservation measures incorporated into the projects minimize or avoid direct impacts to rearing coho salmon and riverine habitats, and 4) replacement of bridges will improve the ability for the TRD to provide fish habitat restoration flows that would improve potential to recover SONCC ESU coho salmon without impacting bridge and public safety in Trinity County.

Designated critical habitat for the above-listed species *is not likely to be adversely modified* as a result of implementing the proposed riparian revegetation, erosion control, and slope protection mitigation measures, and because of the eventual long-term interrelated benefits of the Proposed Action to the TRRP sediment and flow management efforts. Only about 0.083 acre of riparian wetland providing SRA habitat would be permanently removed as a result of the project. An additional 0.707 acre would be temporarily disturbed by construction activities. All riparian habitat lost to construction would be replaced on-site, such as through revegetation of old bridge sites. Slope protection rip-rap would be placed in about 100 lineal feet of coho rearing habitat (i.e., a run and corner pool at Salt Flat). This impact is considered to be short-term since mitigation by inter-planting with riparian vegetation would restore SRA habitat value to the site over time.

Potential impacts to EFH for coho and chinook salmon were also evaluated in this document. As mentioned above, it is anticipated that the proposed project would result in the loss of only about 0.083 acre of riparian wetland contributing to SRA habitat, which would be replaced on site through revegetation of the old bridge alignments. Construction activities may also result in a temporary

increase in turbidity, sedimentation, and potential for accidental spills. Potential effects associated with impaired fish passage and mortality of rearing salmonids during construction, though unlikely, would be avoided, or minimized, by restricting in-stream construction activities to June 15th through September 15th, or October 15th during the first year of construction, and implementing mitigation measures for in-water work addressing clearing fish from work areas and habitat restoration.

Mitigation consists of several components, including establishment of exclusionary zones for construction access to minimize riparian vegetation impacts; water quality control measures; not obstructing fish passage at temporary side-channel crossings and at in-channel work ramps; using clean spawning-sized gravel fill for work platforms; screening "make-up" water pump intakes and using off-stream seep wells for construction water; and replacement of SRA habitat at a 3:1 ratio (per woody riparian plant for permanent loss) within the project ESL and 3:1 ratio (per woody riparian plant for temporary disturbance) within the project ESL in areas disturbed during construction.

Section 9

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Section 10

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APPENDIX A

Detailed Project Description

Appendix A

Detailed Project Description

Proposed Action – Salt Flat

The proposed action bridge at Salt Flat will be constructed approximately 4 to 44 feet downstream (centerline to centerline) of the existing left and right bridge abutments, respectively. The new alignment will diverge approximately 8 degrees from the existing bridge alignment. Because the new left abutment will be constructed nearly at the location of the existing left abutment, the first flatcar span of the existing bridge will be "rotated" and modified to provide temporary construction access for the property owners. The bridge will be constructed on private property, and will be owned collectively by the Salt Flat Subdivision property owners. The bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 280 feet long (two 140 foot spans), with an 18-foot clear roadway width, designed to carry HS20 loading. New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The proposed action requires raising the left road approach approximately 4 feet to provide sufficient hydraulic freeboard over the river.

The increased span length will provide a wider flow area under the bridge, reducing the backwater surface elevations and water velocities. This will result in a more natural condition than the existing constricted channel. The left abutment and single column bent supporting the superstructure will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor to minimize construction activity in the active low-flow channel for these components. Engineered abutment fill slopes and rip-rap will encroach beyond the river channel edge at the right abutment.

The single column bent will be constructed on the mid-channel bar above the active low-flow channel elevation. The contractor will be required to provide access to the mid channel bar by constructing a temporary crossing that provides a stable route for equipment and contractor personnel. The crossing will minimize impacts to beneficial uses, including aquatic organisms and domestic and agricultural water supplies. The temporary crossing will be constructed by placing and contouring spawning gravel in the channel to provide an adequate base for placement of steel landing mats (similar to temporary military runway matting). The mats will be placed approximately 1-foot below the low-flow water surface elevation and will extend up the channel banks to an elevation providing approximately 3 feet of freeboard above the low-flow water surface elevation. The mats will remain in place until removed during the subsequent in-channel construction season. The contractor will be limited to working in the active low-flow channel from June 15 th to October 15th during the first year (installation of temporary crossing to access bent construction site and in-water excavation), and June 15th to September 15th in the subsequent year. The bent will be a 3.5-foot diameter column anchored to bedrock in one 3.5-foot diameter drilled shaft. It will have a small "foot print," impacting the least amount of area, and will be relatively quick to install. It is estimated that a working platform with an area 35-foot wide by 55-foot

long (+/- 1900 ft^2) will be needed for equipment setup, access for bent construction and crane operation. The working platform will be constructed using cut-and-fill methods with existing site materials and/or imported spawning gravels. Dump trucks and earthmoving equipment may be used to construct the mid-channel bar platform. Bent construction will be accomplished using standard equipment and procedures based on types of equipment available. The reinforced concrete abutments and wingwalls will be founded on drilled shafts anchored in bedrock.

The contractor will utilize the mid-channel bar platform for bent construction and for positioning a crane to lift the bridge superstructure in place. It is anticipated the superstructure will be placed in the Fall season after the in-river construction period has ended. Side channel crossing to access the platform will be kept to a minimum and is anticipated to occur roughly 10 to 20 times for each construction component (i.e. bent and superstructure installation). Vehicles crossing the side channel may include: earthmoving equipment, crane(s) and trucks. The contractor will be required to clean vehicles prior to crossing the side channel. Staging areas for construction will be located immediately upstream or downstream of the existing left abutment or may be located upstream on the private property approximately 200 feet upslope from the left abutment.

All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. Make-up water pumped from the river will pass through a screen at the inlet with maximum ¼-inch openings and a maximum intake velocity of 0.8 feet-per-second. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts. Slope protection measures will be implemented at abutments and constructed slopes to provide erosion protection from high flows.

Demobilization procedures will include clean up of all construction debris, fine-grading and contouring to "blend" new grades to existing grades and revegetation where required by final design and/or permits.

Design Criteria

The following documents were referenced to develop the bridge design:

- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* (Fourth Edition, 2001);
- AASHTO *Standard Specification for Highway Bridges* (16th Edition, 1996, with Interims and Revisions by Caltrans);
- Caltrans and FHWA bridge planning and design manuals;
- Trinity County Design Guidelines, policies and requirements;
- Trinity County's Fire Safe Ordinance;
- *Estimation of 50-and 100-Year Tributary Accretion Floods; Lewiston Dam to Treadwell Bridge, Trinity River, California*, by Scott McBain, McBain and Trush, April 30, 2002;
- *Trinity River Restoration Program – Trinity River Bridge Hydrologic Analysis, Draft Report,* Bureau of Reclamation Technical Service Center, December 2002.

The AASHTO design vehicle, HS20-44, is a three-axle vehicle weighing a total of 36 tons. Structures designed for the HS20-44 design vehicle are capable of carrying any legally loaded vehicles allowed to travel on highways without a permit.

Hydraulics

A U.S. Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) hydraulic model was developed and calibrated to match measured water surface elevations upstream of the existing bridge. The proposed action replaces the existing bridge with a new bridge immediately downstream. To obtain design water surface elevations for the range of anticipated flows, a HEC-RAS model was created to simulate a new bridge at the downstream location. **Table 2-1** lists the anticipated flows and corresponding water surface elevations for the proposed bridge structure.

Table 2-1

FLOW DISCHARGES AT SALT FLAT BRIDGE @ RM = 106.94

NEW BRIDGE UPSTREAM OR DOWNSTREAM OF EXISTING BRIDGE

TRINITY DAM DISCHARGES PLUS TRIBUTARY FLOWS

Flow description	**LC = 1781.5 TOD = 1784.0 (cfs)**	**Water Surface Elevations**
Return Period Peak Flow (Annual with ROD)[a]	Q_{50} = 11,700 Q_{100} = 12,900	El. = 1779.4 El.= 1779.9
Maximum Controlled - flow Release [b]	Q_{MCR} = 14,900	El. = 1780.6
Estimated flow during 1/1/97 [c]	Q_{1997} = 11,000	El. = 1779.0

Notes:

[a] Return Period Peak Flow – Annual with ROD – Combined winter and spring considering all 5 ROD water years. Includes a possible 11,000 cfs release from Lewiston Dam in the spring.

[b] Maximum Controlled-Flow Release – 13,750 cfs is the maximum controlled release from Trinity Dam. Combining this flow with 100-year May/June peak tributary flow gives the flow value shown.

[c] Scott McBain of McBain and Trush provided flow estimates for the January 1, 1997 flood event.

[d] Lewiston Dam releases to the Trinity River based on the ROD. 450 cfs is the proposed flow release at Lewiston Dam between July 22 and September 15 of each year. 300 cfs is the proposed flow release at Lewiston Dam between October 16 and April 15 of each year.

LC = Bridge low chord, or bottom of beam elevation at lowest point under the bridge.

TOD = Top of Deck elevation. When top of deck elevation varies across the length of the bridge, the value shown in the table is the lowest top of deck elevation.

RM = Trinity River mile.

msl = Elevation above mean sea level (feet).

Q = Flow rate (cfs)

Using the Q_{50} water surface elevation 1779.4 feet, 2 feet of freeboard, and a 2.5-foot superstructure depth results in a low-chord elevation of 1781.4 feet and a top of deck elevation of 1783.9 feet. The analysis indicates the new bridge will pass the Return Period Peak Flow (Q_{100} = 12,900 cfs), and the Maximum Controlled-Flow Release (Q_{MCR} = 14,900 cfs), without obstruction.

Scour Analysis

Geologic data at Salt Flat Bridge suggest that the entire cross-section is underlain by granite bedrock at depths ranging from 0.5 to 30 feet below ground surface. Near the left abutment, boring logs revealed 12 to 14 feet of fill and alluvial material above the bedrock strata. Depth of alluvium in the channels underneath the bridge varies from about 6 feet in the left channel to less than 1 foot in the main channel bed. Depth to bedrock near the right abutment is estimated to be between 20 and 30 feet.

The presence of shallow bedrock and a wide, "flat" and low left overbank area in the vicinity of the bridge reduce the potential of scour during high-flow events. The bridge abutments may be vulnerable to scour but the main channel bed is generally protected from scour by the shallow depth to bedrock. The pier foundations may extend to bedrock, but their depths and connections to bedrock are unknown.

The California Department of Water Resources (DWR) collected cross-section survey data in the Trinity River from Lewiston Dam downstream to the Trinity River North Fork confluence prior to the January 1, 1997 flood. Subsequent cross-section data was collected during the 1999 to 2001 time-period. Comparison of the pre-1997 and post-1997 cross-section profiles suggests that no significant long-term channel degradation resulted from the 1997 flood event. Localized scour may have occurred during this event, but did not cause failure of the piers or abutments. The data suggests that sediment from the upstream bed filled in scour holes that may have developed at or near the bridge during the 1997 event.

Alignment and Design Speed

The design speed for the approaches and the bridge is 15 mph. The proposed raised roadway alignment from the left approach follows the existing alignment. A 500-foot radius horizontal curve transitions the roadway alignment to the new bridge alignment. The centerline of the new bridge is approximately 4-feet and 44-feet downstream of the existing centerline at the left and right abutments, respectively. The bridge begins at Station 5+10 (left side of the river) and ends at Station 7+90 (right side of the river). A horizontal curve with a 45-foot radius ties the new road alignment to the existing road alignment beyond the right approach. The proposed alignment is approximately 920 feet long.

Roadway Approaches

The roadway profile design is based on Caltrans and FHWA guidelines for 2 feet of hydraulic freeboard above the 50-year flow event and the ability to pass both the 100-year flow event and the maximum predicted flow (Maximum Controlled Release, see **Table 2-1**). Therefore, the minimum low-chord elevation based on the HEC-RAS hydraulic model is 1781.4 feet MSL. With a superstructure depth of 2.5 feet, the resultant minimum deck elevation is 1783.9 feet MSL – approximately 4.0 feet above the existing left approach.

The proposed vertical alignment (left) descends at a 7.4 percent grade from Goose Ranch Road towards the bridge. A 100-foot vertical curve, beginning at station 1+25 reduces to the grade to 0.0 percent with an elevation of 1,781.5 feet MSL. The alignment continues level for approximately 154 feet (sta 3+79) where it transitions to a 2.35 percent ascending grade through a 50-foot vertical curve. The proposed bridge begins at sta 5+10 and continues on an ascending 2.35 percent grade. The bridge ends at sta 7+90. An 80-foot vertical curve from sta 8+10 transitions the right vertical profile from 2.35 percent to the existing roadway grade of 9.23 percent (sta 8+10 to 8+90). The proposed bridge and roadway require approximately 2,300 cubic yards of imported embankment material.

The new bridge and roadway profile will be designed to provide adequate sight distance in accordance with Caltrans and FHWA standards. To meet 15 mph design speed requirements, the right approach requires a horizontal curve with a 45-foot radius. The bridge will have an 18-foot clear roadway width and provide two 9-foot lanes. The total structure width including the truss members is approximately 22 feet.

Bridge Replacement

For the Proposed Action, the replacement bridge will have an 18-foot clear roadway width and provide two 9-foot lanes. The total structure width including the truss members is approximately 22 feet.

Channel Scour / Slope Protection

Subsurface exploration has been completed at the bridge site. Drilled shafts founded on bedrock will be installed for the bent and left abutment, eliminating the potential of structural damage from scour. The right abutment will be supported on drilled shafts founded in the engineered fill slope and extending down to competent foundational soils or bedrock. The engineered fill and rip-rap will extend below the calculated scour depth of the river. It is estimated that approximately 8.5 feet of scour may occur at the bent and approximately 6.5 feet of scour will occur at the right abutment. However, the drilled shaft tip elevations will extend below the potential scour depth. Additionally, DWR surveys suggest that the stream channel is not degrading. Slope protection/rip-rap will be provided at both abutments, and will be sized such to prevent scour. The limits and size of slope protection will be shown on the final drawings.

Drainage

The proposed bridge and roadway will have a crowned cross section, which will provide sufficient gradient for drainage of surface water. Each approach will include an asphalt apron to receive mud and water from vehicles approaching the bridge, minimizing introduction of contaminated water or sediment to the stream. Drainage of the bridge deck will be designed to prevent direct discharge of stormwater from the deck to the live stream.

Right-of-Way

The existing bridge and the Proposed Action bridge are both located on private property. Additional easement(s) downstream will be required to accommodate the proposed bridge, roadway alignment, and approach embankments. BLM may require a special permit for temporary construction activity at the right approach. Temporary construction easements on both sides of the proposed bridge will be necessary for construction activities. The recommended temporary construction easements, existing easement limits, and existing property lines are depicted in **Figure A-1**. Specifications will require that clearing and grubbing of vegetation be kept to a minimum.

Utilities

No overhead utilities were observed and there do not appear to be any underground public utilities in the bridge vicinity. Utilities that may be impacted by the Proposed Action include the private service well and water lines along the north edge of Salt Flat Road and the well located south of the right (west) abutment. Portions of the service lines may need to be relocated. The well located near the right abutment will be relocated downstream beyond the abutment footprint and construction zone. Trinity County does not expect this project to impact the facilities of the Fire District, Water District, Public

F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Salt_Flat_Easements.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region; Trinity County 03-11-03 tkoehler

North State Resources, Inc.

Figure A-1. Salt Flat Project Layout
& Construction Easements
Trinity River Bridges Project
March 11, 2003

Utilities District, or telephone service. Future utility access (conduits) can be attached to the steel truss members of the new bridge structure.

Bridge Railing

Appropriate signs, including speed limit and private road access, will be added on each roadway approach. Approach guardrails will be constructed at both ends of the bridge. Bridge railing will be constructed of weathering steel supported by timber posts. Railings will conform to the full-scale crash-test criteria Test Level 2 (TL-2) established in the National Cooperative Highway Research Program (NCHRP) Report #350. These criteria require TL-2 for roadways with design speeds of 25 mph.

Construction Criteria and Methods

Specifications

Construction specifications will be developed by Reclamation, and will meet Caltrans Standard Specifications, and the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Construction Process Overview

The list of construction activities provided below is not intended to be a precise or comprehensive construction schedule. Some of these construction processes may temporarily affect property owner access.

- Modify and rotate first span of existing bridge at left abutment
- Construct engineered fill slope and rip-rap at right abutment, including in-channel excavation
- Construct staging areas for installing drilled shafts for abutments and bent. Staging areas consist of a level area for equipment set up, access and material storage.
- Construct temporary crossing over low flow channel to access bent location
- Drill shafts
- Construct formwork for abutments and bent
- Place reinforcement and concrete
- Assemble and erect prefabricated bridge
- Construct roadway approaches and tie into existing roads
- Remove existing railroad flatcar bridge superstructures
- Install slope protection as required
- Install spawning size gravel access ramps to existing in-channel piers
- Remove existing bridge abutments and piers
- Fine-grading and additional slope protection or revegetation

In-River Construction

The left abutment and single column bent that will support the superstructure will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor to access and install the supports without working in the active low-flow channel. The engineered fill slope and rip-rap associated with right abutment foundations will encroach slightly beyond the riverbank. The single column bent will be constructed on the mid-channel bar above the active low-flow channel. The contractor will be required to access to the mid channel bar by constructing a temporary crossing that provides a stable route for equipment and contractor personnel. The crossing will minimize impacts to beneficial uses, including aquatic organisms and domestic and agricultural water supplies. Construction of the temporary crossing may necessitate use of an excavator and a dozer.

The temporary crossing will be constructed by placing and contouring spawning gravel in the channel to provide an adequate base for placement of steel landing mats (similar to temporary military runway matting). The mats will be placed to provide approximately 1-foot of water depth in the active low-flow channel and will extend up the channel banks to an elevation providing approximately 3 feet of freeboard above active low-flow water surface elevation. The mats will remain in place until removed during the subsequent in-channel construction season. The contractor will be limited to construction and working in the active low-flow channel from June 15th to October 15th during the first year and June 15th to September 15th in the subsequent year. The contractor will utilize mid-channel bar platform for bent construction and for craning the bridge superstructure in place. It is anticipated the superstructure will be placed in the Fall season after the in-river construction period has ended. Side channel crossing to access the platform will be kept to a minimum and is anticipated to occur roughly 10 to 20 times for each construction component (i.e. bent and superstructure installation). Vehicles crossing the side channel may include: earthmoving equipment, crane(s), and trucks. The contractor will be required to clean vehicles prior to crossing the side channel.

Construction of the right abutment engineered fill slope will require work within the channel near the right bank. The fill slope and rip-rap will extend below the active low-flow water surface elevation and approximately 6 feet below the existing channel depth for approximately 100 lf along/near the right channel bank.

Depending on contractor methods, demolition and removal of piers 2 and 3 may require installation of in-channel access ramps extending from the right and left banks to the piers. Ramps will be constructed similar to the mid-channel bar crossing described above. The in-channel ramps/crossings will be constructed upstream of the existing bridge and will cross the side channel and extend from the left and right banks to a point at or near piers 2 and 3. The ramps will be constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation. Estimated quantity of gravel is approximately 25, 35, and 100 cubic yards for the low-flow channel crossing, left bank and right bank ramps, respectively. Landing mats may be utilized on the ramp surfaces if necessary to support the equipment used. After demolition, the ramp gravel will be distributed/contoured over the adjacent channel bottom.

Demolition of steel pilings may require use of a crane, cutting torches and/or other demolition equipment. The contractor will be required to prevent debris from demolition activities from remaining in the river. Currently, loose, unattached concrete debris exists in the main channel (likely from a previous bridge).

The contractor will be required to remove and dispose of the existing concrete debris to the extent practicable.

All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts.

A seep well will be constructed outside the active low-flow channel to provide construction "make-up" water for all construction activities. A backhoe may be used to excavate and backfill soils at the seep well site. The well will consist of large diameter, perforated pipe placed vertically in the soil to a depth below the groundwater level. The annular space around the pipe will be filled with large aggregate soil to promote groundwater flow to the well.

Dewatering Activities

All material and water required for drilling and installing the bent and abutments will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor.

Should dewatering be required for construction at the site, the dewatering discharge will be contained in a tank or onsite containment/infiltration basin. In the event that an infiltration basin is used, discharge to the basin will be limited to water/groundwater only and will not be contaminated with deleterious construction byproducts. In any event, water discharged back to the stream will comply with water quality standards.

Pier Construction

Bent construction will be accomplished using standard equipment and procedures based on types of equipment available. The reinforced concrete abutments and wingwalls will be founded on drilled shafts anchored in bedrock. All material and water used for drilling operations will be contained and disposed of at an approved off-site disposal site. The contract specifications will prohibit discharge of cement fines, drilling fluids, contaminated water or other construction byproducts. Slope protection measures will be implemented at abutments and constructed slopes to provide erosion protection from high flows.

Traffic Control / Detour

The proposed action enables use of the existing bridge for property owner and construction access. The contractor will provide traffic control. The contractor will ensure reasonable access for the property owners without long-term closures. Temporary closures of Salt Flat Road and the existing bridge may be required during the construction of the new road alignment or abutment(s).

Bridge Demolition

Removal of the existing bridge will occur after the new bridge is open to traffic. Demolition of the flatcars and pilings may require use of a crane, cutting torches and/or other demolition equipment. The railroad flat cars, abutments, and piers will be dismantled and salvaged or hauled to approved and appropriate disposal sites. Construction debris resulting from demolition will not be allowed to enter the

stream. The contractor will be required to submit a demolition plan to BOR for approval. Any demolition activities that may create lead paint chips will require a lead containment system.

The selected method of disposition of the existing bridge components (demolition or re-use elsewhere) will determine the amount and type of wastes produced. The following procedures will apply to the contractor's selected demolition and/or removal activities:

- Asphalt and tar waste from the bridge should be recycled.
- Because of the presence of lead paint on the existing bridge structure, none of the painted metal portions of the existing bridges will be sawed, burned, or sanded. If cutting torches are used on painted metal surfaces, contractor will comply with appropriate regulations for safety, disposal and collection of byproducts. If disposal is chosen by the contractor, the existing bridgework should be disposed of in a properly licensed landfill. Demolition workers should be protected according to the provisions of 8 CCR 1532, "Lead in Construction." Prior to demolition or re-use of the bridge, a licensed lead-based paint removal contractor should remove any loose, lead-based paint that is chipping or peeling from the bridges. The lead waste (paint chips, dust, etc.) should be disposed of appropriately.
- There will likely be some amount of treated wood waste produced. If disposal of treated wood waste is required, it will be disposed of at an appropriate landfill site.

Depending on contractor methods, demolition and removal of piers 2 and 3 may require installation of in-channel access ramps extending from the right and left banks to the piers. The in-channel ramps/crossings will be constructed upstream of the existing bridge and will cross the side channel and extend from the left and right banks to a point at or near piers 2 and 3. The ramps will be constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation. Estimated quantity of gravel is approximately 25, 35, and 100 cubic yards for the low-flow channel crossing, left bank and right bank ramps, respectively. Landing mats may be utilized on the ramp surfaces if necessary to support the equipment used. After demolition, the ramp gravel will be distributed/contoured over the adjacent channel bottom.

Currently, loose, unattached concrete debris exists in the main channel from a previous bridge. The contractor will be required to remove and dispose of the existing concrete to the extent practicable.

Contractor Staging and Storage Areas

The existing bridge location will provide primary site access. Contractor staging areas are expected to be available within the temporary easement areas upstream and downstream of the existing bridge. The temporary construction easement areas are shown in **Figure A-1**. The contractor will be required to place lath, flagging or other suitable markers at the edge of the temporary construction easements to show workmen the limits within which they must stay. These figures identify access routes, roads, borrow areas, and waste sites. The primary contractor staging area will likely be located on private property just upstream or downstream of Salt Flat Road between Goose Ranch Road and the existing bridge. Alternate locations are yet to be determined

It is estimated that a working platform with an area 35-foot wide by 55-foot long (1900 ft^2), constructed of clean gravels, will be needed for equipment setup and access for bent construction. Dump trucks may

be used to transport material for construction of the platform. Staging areas consist of a level area for equipment set up, access and material storage.

Depending on contractor methods, demolition and removal of piers 2 and 3 may require installation of in-channel access ramps extending from the right and left banks to the piers. Ramps will be constructed similar to the mid-channel bar crossing described above. The in-channel ramps/crossings will be constructed upstream of the existing bridge and will cross the side channel and extend from the left and right banks to a point at or near piers 2 and 3. The ramps will be constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation. Estimated quantity of gravel is approximately 25, 35, and 100 cubic yards for the low-flow channel crossing, left bank and right bank ramps, respectively. Landing mats may be utilized on the ramp surfaces if necessary to support the equipment used. After demolition, the ramp gravel will be distributed/contoured over the adjacent channel bottom.

Air Pollution and Dust Control

Efforts will be made to minimize air pollution. BOR specifications require that the contractor comply with all applicable air pollution control rules, regulations, ordinances, and statutes. Contract documents will specify that the contractor will be responsible to limit dust by watering construction site areas used by trucks and vehicles.

Fill Import and Export

Embankment material is typically a well-graded mixture of clayey sand (SC), sandy lean clay (CL), lean clay (CL), silt (ML), or silty sand (SM). Embankment material gradation typically has a minimum of 20 percent by dry weight, of soil particles passing a No. 200 United States Standard sieve, with a maximum particle size of 4 inches in maximum dimension. The material shall be obtained from on-site excavation or other approved sources and will be free from chemical contamination, vegetation, roots, trash, debris, or other unsatisfactory material. All lumps, clods, and oversize particles shall be removed.

When riprap for slope protection is required, the rock used for riprap shall be hard, dense, and durable. Either quarried rock or boulders may be used for riprap. Since no riprap is available onsite, all material used for slope protection will be imported. The rock in riprap shall be reasonably well graded from the maximum size down to the minimum size as shown in **Table 2-2**, Rock sizes and riprap thickness.

TABLE 2-2

ROCK SIZES AND RIPRAP THICKNESS

Nominal Thickness, inches	36	30	24	18	12
Maximum Size Rock	1 yd3	1/2 yd3	1/4 yd3	1/8 yd3	1 ft3
Minimum Size Rock	1/10 ft3	1/10 ft3	1/10 ft3	1/10 ft3	1-1/2 inches

The proposed Salt Flat Bridge and roadway require approximately 2300 cubic yards of imported embankment material. This material will be hauled from an approved borrow source. An estimated 620 cubic yards of riprap will be required for slope protection and abutment protection.

Water Pollution Prevention

The contractor shall also implement water pollution control measures that conform to applicable and appropriate permits. The contractor will be required to use extreme care to prevent dirt, debris and miscellaneous demolition byproducts from entering the stream. Some of the key water pollution control measures that shall be implemented are listed below:

- The Contractor shall exercise every reasonable precaution to protect the Trinity River from pollution with fuels, oils, bitumen's, calcium chloride, and other harmful materials and shall conduct and schedule operations to avoid or minimize muddying and silting of the River. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.

- Water pollution control work is intended to provide prevention, control and abatement of water pollution to the Trinity River, and shall consist of constructing those facilities that may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.

- The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary as a result of the Contractor's operations. The Contractor shall coordinate water pollution control work with all other work done on the contract.

- Before starting any work on the project, the Contractor shall develop an agency-approved program to control water pollution effectively during construction of the project. The program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures which the Contractor proposes to take in connection with construction of the project to minimize the effects of the operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project until the program has been accepted.

- Where erosion that will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.

- Nothing in the terms of the contract shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

The Contractor shall also conform to the following provisions:

- Where working areas encroach on live streams, and to the extent practicable, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of the barriers, muddying of streams shall be held to a minimum.

- Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.

- Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.

- Portland cement or fresh Portland cement concrete shall not be allowed to enter flowing water of streams.

- Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.
- Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct work operations that allow free passage of the migratory fish.

Tentative Schedule

The project schedule is based on a Contract Award in Summer, 2003. Mobilization would occur shortly thereafter. The majority of the scheduled work from mobilization to opening of the bridge to traffic would be completed in 220 calendar days.

A project of this magnitude might typically be expected to take 2 years to complete. The majority of the construction is expected to be complete by Spring 2004, with rehabilitation and final construction activities extending through Summer or Fall, 2004. The work remaining after bridge opening (i.e., removal of existing abutments and piers, fine grading and revegetation) would occur in the following window for working within the low-flow active channel (June 15 to September 15, 2005). This will require an additional 50 calendar days at the bridge site.

Construction associated with the Trinity River Bridges Project cannot begin until the environmental documentation has been adopted by Reclamation, BLM, and the County; preparation of final design, plans, specifications, and cost estimates; acquisition of ROW; acquisition of permits; and design approvals from state and federal agencies.

Proposed Action – Bucktail Bridge

The Proposed Action for the Bucktail Bridge consists of raising the west approach roadway and replacing the existing 30-inch diameter culvert, approximately 215 feet right (west) of the existing bridge, with a 9-foot wide by 4-foot high arch structure. The arch culvert design will include a natural "bottom" and will increase the conveyance of flows under the Browns Mountain Road embankment. The design also includes raising the Browns Mountain roadway profile approximately 4.5 feet to an elevation of 1760.5 MSL. The arch structure will have the capacity to convey approximately 80 cfs (existing culvert capacity is approximately 10 cfs). The existing roadway is overtopped during high flow events. The roadway profile will be raised and improved so that the road is not overtopped during high flows. The new roadway embankment and culvert will exhibit hydraulic characteristics similar to the existing system but will be overtopped only during extreme high-flow events greater than the 100 year event The new culvert structure will be long enough so that the Browns Mountain Road width will remain 32-feet wide with 2:1 side slopes, and will include guardrails. The existing bridge will provide about 1.2 feet of freeboard for Q_{100} (13,100 cfs) at the low chord, which is on the bridge right abutment. The freeboard will be higher at the left abutment. For a flow of 15,000 cfs, the water surface elevation is approximately 0.4 feet below the low chord. Slope protection will be provided on both sides of the right approach roadway to protect the embankment from erosion.

The process for arch culvert installation requires: excavation and removal of the existing culvert; excavation of dewatering trenches outside of culvert footing zone(s) (potentially, depending on seasonal groundwater variation); preparation of culvert "bottom" streambed and installation of footings and culvert panels and reconstruction of the roadway embankment.

The Proposed Action does not require any work within the active low-flow channel (Q = 450 cfs). A detour will be constructed around the existing road and culvert located to the west of the existing bridge, outside of the active low-flow channel. It is estimated that the detour will be in operation for a period of about 8 to 10 weeks. The detour will be built within the active flood plain, northerly of the existing road. To construct the detour, the contractor may use an excavator, a dozer or other equipment as needed. The existing bridge will remain in place and open to traffic at all times during construction, and will be used to provide access for homeowners and construction equipment and personnel. Keeping the existing bridge open will minimize impacts to the homeowners. Traffic control will be the provided by the contractor and it is the contractor's responsibility to provide access for the homeowners. Temporary closures of Browns Mountain Road and Bucktail Bridge may be needed at certain times during construction and near the completion of the work, when tying the new road alignment onto the existing road alignment.

Design Criteria

The following documents were referenced to develop the new culvert and roadway elevation design:

- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* (Fourth Edition, 2001);
- AASHTO *Standard Specification for Highway Bridges* (16th Edition, 1996, with Interims and Revisions by Caltrans);
- Caltrans and FHWA bridge planning and design manuals;
- Trinity County Design Guidelines, policies and requirements;
- Trinity County's Fire Safe Ordinance;
- *Estimation of 50-and 100-Year Tributary Accretion Floods; Lewiston Dam to Treadwell Bridge, Trinity River, California*, by Scott McBain, McBain and Trush, April 30, 2002;
- *Trinity River Restoration Program – Trinity River Bridge Hydrologic Analysis, Draft Report,* Bureau of Reclamation Technical Service Center, December 2002.

The AASHTO design vehicle, HS20-44, is a three-axle vehicle weighing a total of 36 tons. Structures designed for the HS20-44 design vehicle are capable of carrying any legally loaded vehicles allowed to travel on highways without a permit.

Hydraulics

A hydraulic model was developed and calibrated to match measured water surface elevations upstream of the existing bridge using HEC-RAS. These water surface elevations were calculated with the bridge substructure and superstructure in place. Also included in the hydraulic analysis was a determination of the maximum flow that can pass under the existing bridge without obstruction.

To evaluate comparative culvert capacity, a model was developed that calculates water surface elevations with a raised roadway and the existing 30-inch culvert. To ensure the approach road right of the bridge is not overtopped during high flows, the right approach road is raised to elevation 1760.5 feet. An analysis of the existing 30-inch diameter culvert left in place, and addition of a berm on the right bank of the river to protect the residential structures from flooding was performed. To obtain appropriate water surface elevations the HEC-RAS analysis was redone. The comparative water surface elevations are shown in **Table 2-3**.

TABLE 2-3

FLOW DISCHARGES AT BUCKTAIL BRIDGE @ RM = 105.04

EXISTING BRIDGE, RAISED ROAD AND EXISTING 30" CULVERT

TRINITY DAM DISCHARGES PLUS TRIBUTARY FLOWS

Flow Description	LC = 1757.8 TOD = 1762.2 (cfs)	Water Surface Elevations at Bridge (ft)	Water Surface Elevations at 30" Culvert (ft)	Water Surface Elevations at RM 105.14
Return Period Peak Flow (Annual with ROD) [a]	Q_{50} = 11,700 Q_{100} = 13,100	El. = 1756.0 El.= 1756.6	El. = 1758.5 El.= 1759.4	El. = 1759.1 El.= 1760.0
Maximum Controlled - Flow Release [b]	Q_{MCR} = 15,000	El. = 1757.4	El. = 1760.7	El. = 1761.2
Estimated flow during 1/1/97 [c]	Q_{1997} = 11,000	El. = 1755.6	El. = 1757.9	El. = 1758.5

Notes:

[a] Return Period Peak Flow – Annual with ROD – Combined winter and spring considering all 5 ROD water years. Includes a possible 11,000 cfs release from Lewiston Dam in the spring.

[b] Maximum Controlled-Flow Release – 13,750 cfs is the maximum controlled release from Trinity Dam. Combining this flow with 100-year May/June peak tributary flow gives the flow value shown.

[c] Scott McBain of McBain and Trush provided flow estimates for the January 1, 1997 flood event.

[d] Lewiston Dam releases to the Trinity River based on the ROD. 450 cfs is the proposed flow release at Lewiston Dam between July 22 and September 15 of each year. 300 cfs is the proposed flow release at Lewiston Dam between October 16 and April 15 of each year.

LC = Bridge low chord, or bottom of beam elevation at lowest point under the bridge.

TOD = Top of Deck elevation. When top of deck elevation varies across the length of the bridge, the value shown in the table is the lowest top of deck elevation.

RM = Trinity River mile.

msl = Elevation above mean sea level (feet).

Q = Flow rate (cfs)

The hydraulic analysis suggest that the raised road acts like a dam and causes the flow that would normally be flowing over the road to be backed up. Therefore the water surface elevations at the culvert and bridge range from about 0.4 to 0.7 feet higher than the existing condition. The water surfaces at RM 105.14 did not change substantially in this comparative analysis.

To reduce the water surface elevations at the culvert and bridge (assuming the raised road condition west of the bridge), several models were run to determine the optimum size culvert. It was determined that

replacement of the 30-inch culvert with a new 9 foot wide by 4 feet high arch culvert would provide near optimum water surface elevation results. For the proposed action (raised road and 9 x 4 arch culvert structure), the HEC-RAS hydraulic model was modified. The calculated water surface elevations are shown on Table 2-4.

TABLE 2-4

FLOW DISCHARGES AT BUCKTAIL BRIDGE AT RM = 105.04

EXISTING BRIDGE, RAISED ROAD AND NEW 9X4 ARCH STRUCTURE

TRINITY DAM DISCHARGES PLUS TRIBUTARY FLOWS

Flow Description	LC = 1757.8 TOD = 1762.2 (cfs)	Water Surface Elevations at Bridge (ft)	Water Surface Elevations at 9x4 Arch Structure (ft)	Water Surface Elevations at RM 105.14
Return Period Peak Flow (Annual with ROD) [a]	Q_{50} = 11,700 Q_{100} = 13,100	El. = 1755.9 El.= 1756.4	El. = 1758.4 El.= 1759.2	El. = 1759.0 El.= 1759.9
Maximum Controlled - flow Release [b]	Q_{MCR} = 15,000	El. = 1757.3	El. = 1760.5	El. = 1761.1
Estimated flow during 1/1/97 [c]	Q_{1997} = 11,000	El. = 1755.6	El. = 1757.9	El. = 1758.5

Notes:

[a] Return Period Peak Flow – Annual with ROD – Combined winter and spring considering all 5 ROD water years. Includes a possible 11,000 cfs release from Lewiston Dam in the spring.

[b] Maximum Controlled-Flow Release – 13,750 cfs is the maximum controlled release from Trinity Dam. Combining this flow with 100-year May/June peak tributary flow gives the flow value shown.

[c] Scott McBain of McBain and Trush provided flow estimates for the January 1, 1997 flood event.

[d] Lewiston Dam releases to the Trinity River based on the ROD. 450 cfs is the proposed flow release at Lewiston Dam between July 22 and September 15 of each year. 300 cfs is the proposed flow release at Lewiston Dam between October 16 and April 15 of each year.

LC = Bridge low chord, or bottom of beam elevation at lowest point under the bridge.

TOD = Top of Deck elevation. When top of deck elevation varies across the length of the bridge, the value shown in the table is the lowest top of deck elevation.

RM = Trinity River mile.

msl = Elevation above mean sea level (feet).

Q = Flow rate (cfs)

Scour Analysis

CH2M Hill drill holes and Bureau of Reclamation drill holes logged at Bucktail Bridge (Sherer, 2001) estimate 20 ft at the left abutment and 22 ft at the right abutment of fill and coarse alluvium and above a dense, coarse, very hard layer of conglomerate sediments. This conglomerate layer is well cemented by sand and clay fines and would be extremely resistant to erosion, even at high flows if exposed. In the main channel, minimum-overlying alluvium is thought to exist (0 to 2 ft) above the conglomerate.

The existing bridge geometry with the proposed low arch culvert with 1760.5 msl road embankments was modeled. Using the Q_{100} flow of 13,100 cfs, preliminary hydraulic computations for this flow determined that approximately 13,013 cfs was will pass under the bridge while the remaining 87 cfs will pass through

the culvert. Scour was calculated for the bridge location only. Scour at the culvert should be insignificant for the Q_{100} flow due to relatively low flow velocities analyzed through the culvert (approximately 3.2 ft/s). Substrate grain size data was used from tests at Salt Flat and Poker Bar.

Contraction and abutment scour were estimated at the bridge. The lowest bottom of scour hole elevation (approximately 1738.0 msl) was noted near the center of the channel due to an estimated contraction scour depth of 2 ft. The depth of scour was computed as 7.7 ft at the left abutment and 6.2 ft at the right abutment. The resultant approximate bottom of scour hole elevations at the abutments is 1741.0 msl and 1742.0 msl at the left and right abutments, respectively.

According to the BOR 2001 geologic report and the CH2M-Hill exploratory boring logs, a continuous hard conglomerate layer exists at about 1742.5 msl in the vicinity of the left abutment. In the main channel, the elevation of this hard conglomerate layer is estimated to be 1738.5 msl. The hard conglomerate layer elevation at the right abutment is approximately 1740.5 msl. The hard conglomerate layer described is likely resistant to erosion, preventing scour below the layer. Comparing the approximate hard conglomerate layer elevations to the estimated scour hole bottom elevations shows that the scour depth at the left abutment and in the main channel would likely be controlled by the erosion resistant hard conglomerate layer. At the right abutment, scour might stop just above the elevation of the hard conglomerate layer for the Q_{100} flow.

Alignment and Design Speed

The raised Browns Mountain Road alignment will follow along the centerline of the existing road alignment. Trinity County has determined that Browns Mountain Road should have a design speed of 25 mph. Browns Mountain Road will be raised approximately 4.5 feet and constructed to maintain a 32-feet wide clear roadway.

Roadway Approaches

The existing bridge is in good condition and will remain in place. The proposed roadway profile will be raised to an elevation of 1760.5 feet, without affecting the existing bridge. Minimum length vertical curves will be used at the ends of the raised profile to tie to the existing grade. Raising the road to elevation 1760.5 feet will affect approximately 400 feet of existing road. The existing roadway shoulders on the right approach are used extensively during fishing season(s) as parking for access for the "Bucktail Hole". Alternative parking area will be designed to replace the existing shoulders utilizing nearby BLM lands or new roadway shoulders. The proposed site for parking is within the construction staging area.

Bridge Replacement

The existing bridge is in good condition and will remain in place. Though the existing bridge does not provide 2 feet of freeboard for the proposed flows, it will pass all flows considered under this action without obstruction.

Channel Scour / Slope Protection

Geotechnical exploration and analysis has been completed at the bridge site. The existing bridge is on a steel pile foundation, with piles extending to elevation 1727.5 feet. The estimated scour depths are well above the pile tip elevation. The arch culvert structure and footings will be founded on native soil and may include cutoff walls and riprap to provide scour protection. Slope protection will be added at both

existing bridge abutments. Slope protection will be provided on the downstream side of the raised roadway. The limits and size of slope protection will be shown on the construction drawings.

Drainage

The proposed profile, with a crowned cross section, provides sufficient gradient for drainage of roadway surfaces.

Right-of-Way

Temporary construction easements will be required on both sides of Browns Mountain Road to construct the detour, raise the existing road and construct the berm on the right bank.

The Average Daily Traffic (ADT) at the Bucktail Bridge is 170 vehicles per day; therefore the detour will be designed for the following criteria.

- Two 11-foot-wide traffic lanes
- 20 mph design speed
- 90-foot minimum radius curves
- Paved roadway surface
- No low water crossing

Utilities

No overhead utilities were observed and there do not appear to be any underground utilities in the vicinity of the bridge. The County does not expect this project to impact the facilities of the Fire District, Water District, Public Utilities District, and telephone service.

Bridge Railing

Guardrails will be provided on the roadway embankment above the 9x4 arch structure and extend along the road for 50 feet on either side of the structure.

Construction Criteria and Methods

Construction Process Overview

The following is a list of potential construction activities that may be required for the Proposed Action at the Bucktail Bridge site. This list is not intended to be a precise or comprehensive construction schedule, and is not intended to show an exact sequence of construction activities. Some of these construction processes may temporarily affect property owner access.

- Construct detour upstream of Browns Mountain Road to provide access for the contractor and Bucktail subdivision residents during construction. The detour may prevent recreational users from parking near Bucktail Hole.
- Additional parking areas will be identified and shown on the final drawings. Construction schedule will consider specific seasonal high-use periods.
- Remove pavement and excavate to remove existing culvert;

- Construct new arch culvert structure;
- Raise and pave new roadway profile; install slope protection as required;
- Tie new roadway into existing roadway.
- Open Browns Mountain Road to traffic.
- Remove detour, regrade and rehabilitate the site as necessary.

The existing bridge will remain in place and open to traffic at all times during construction, and will be used to provide access for homeowners and construction equipment and personnel. Keeping the existing bridge open will minimize impacts to the homeowners. The contractor will provide traffic control and it is the contractor's responsibility to provide access for the homeowners. Temporary closures of Browns Mountain Road and Bucktail Bridge may be needed at certain times during construction and near the completion of the work, when tying the new road alignment onto the existing road alignment.

Specifications

Construction specifications will be developed by Reclamation, and will meet Caltrans Standard Specifications, and the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Construction Activities

A construction detour around the existing road and culvert is required for this alternative. It is estimated that the detour will be in operation for approximately 8 to 10 weeks. Slope protection will be provided on both sides of the right approach roadway to protect the new roadway embankment from flows that may overtop and may erode the road.

Instream Construction

Construction activities are not anticipated within the active low-flow channel (Q = 450 cfs).

A seep well will be constructed outside the active low-flow channel to provide construction "make-up" water for all construction activities. A backhoe may be used to excavate and backfill soils at the seep well site. The well will consist of large diameter, perforated pipe placed vertically in the soil to a depth below the groundwater level. The annular space around the pipe will be filled with large aggregate soil to promote groundwater flow to the well.

Dewatering Activities

All material and water required for construction of arch culvert and embankment will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor.

Dewatering activities will occur at the location of new arch structure construction and possibly other embankment or detour locations. Dewatering may include installation of temporary dikes and/or cutoff walls and the use of pumps to lower the water table in the immediate vicinity of the construction. Water

pumped from the construction site will be stored in a settling tank or containment/infiltration basin to remove turbidity before discharging to the wetland area below the construction site.

Traffic Control / Detour

The contractor will be responsible for providing temporary access around the site. The proposed detour location and extents are shown on **Figure A-2**. The detour will be designed to safely accommodate standard residential or commercial vehicles. The contractor will provide signage and traffic control to safely detour vehicular traffic around the site. Access may be temporarily denied around the site depending on construction activities. In the event of anticipated closures, the contractor will notify residents in advance of the closure(s).

Contractor Staging and Storage Areas

The existing bridge will provide primary site access. Contractor staging areas are expected to be available within the temporary easement areas. The temporary construction easement areas are shown on drawing **Figure A-2**. The contractor will be required to place lath or other suitable markers at the edge of the temporary construction easements to show workmen the limits they must stay within. **Figure A-2** shows access routes, roads, borrow areas, and waste sites. The recommended main contractor staging area is located within lands administered by the Bureau of Land Management, located just northeast of the existing Bucktail Bridge site.

Air Pollution and Dust Control

Efforts will be made to minimize air pollution. BOR specifications require that the contractor comply with all applicable air pollution control rules, regulations, ordinances, and statutes. Contract documents will specify that the contractor will be responsible to limit dust by watering construction site areas used by trucks and vehicles.

Fill Import and Export

Embankment material is typically a well-graded mixture of clayey sand (SC), sandy lean clay (CL), lean clay (CL), silt (ML), or silty sand (SM). Embankment material gradation typically has a minimum of 20 percent by dry weight, of soil particles passing a No. 200 United States Standard sieve, with a maximum particle size of 4 inches in maximum dimension. The material shall be obtained from on-site excavation or other approved sources and will be free from chemical contamination, vegetation, roots, trash, debris, or other unsatisfactory material. All lumps, clods, and oversize particles shall be removed.

When riprap for slope protection is required, the rock used for riprap shall be hard, dense, and durable. Either quarried rock or boulders may be used for riprap. Since no riprap is available onsite, all material used for slope protection will be imported. The rock in riprap shall be reasonably well graded from the maximum size down to the minimum size as previously shown in **Table 2-2**, Rock Sizes and Riprap Thickness.

An estimated 850 cubic yards of embankment material will be required for the detour and approximately 1000 cubic yards of embankment and structural backfill are required for the raised roadway. This material will be hauled from an approved borrow source. An estimated 100 cubic yards of riprap will be required for slope protection.

North State Resources, Inc.

Figure A-2. Bucktail Project Layout
& Construction Easements
Trinity River Bridges Project
March 11, 2003

Water Pollution Prevention

The contractor shall also implement water pollution control measures that conform to applicable and appropriate permits. The contractor will be required to use extreme care to prevent dirt, debris and miscellaneous demolition byproducts from entering the stream. Some of the key water pollution control measures that shall be implemented are listed below:

- The Contractor shall exercise every reasonable precaution to protect the Trinity River from pollution with fuels, oils, bitumen's, calcium chloride, and other harmful materials and shall conduct and schedule operations to avoid or minimize muddying and silting of the River. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.

- Water pollution control work is intended to provide prevention, control and abatement of water pollution to the Trinity River, and shall consist of constructing those facilities that may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.

- The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary because of the Contractor's operations. The Contractor shall coordinate water pollution control work with all other work done on the contract.

- Before starting any work on the project, the Contractor shall develop an agency-approved program to control water pollution effectively during construction of the project. The program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures that the Contractor proposes to take in connection with construction of the project to minimize the effects of the operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project until the program has been accepted.

- Where erosion that will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.

- Nothing in the terms of the contract shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

The Contractor shall also conform to the following provisions:

- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of the barriers, muddying of streams shall be held to a minimum.

- Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.

- Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.

- Portland cement or fresh Portland cement concrete shall not be allowed to enter flowing water of streams.

- Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.
- Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct work operations that allow free passage of the migratory fish.

Utility Relocation

No utilities will be impacted under this proposal. No relocation will be necessary.

Tentative Schedule

The project schedule is based on a Contract Award date in the Spring or Summer of. Mobilization would begin Summer, 2004 at the Bucktail site. The majority of the scheduled work would be completed within 90 calendar days of mobilization

Construction associated with the Trinity River Bridges Project cannot begin until the environmental document has been adopted by Reclamation, BLM, and the County; preparation of final design, plans, specifications, and cost estimates; acquisition of ROW; acquisition of permits; and design approvals from state and federal agencies.

Proposed Action – Poker Bar Bridges

The proposed action would construct two bridges approximately 35 feet upstream of the existing bridges at Poker Bar. The bridges will remain on private property, and will be the property of the Poker Bar Property Owners Association. The proposed bridge types are single span prefabricated steel trusses with reinforced concrete deck, with an 18-foot clear roadway width, designed to carry HS20 live loading. The proposed bridges are 110 feet long over the left channel, and 80 feet long over the right channel. The prefabricated steel truss heights are 9 feet and 7.5 feet respectively. The bridge superstructure and guardrail will be fabricated with weathering steel. Weathering steel is high strength steel that develops a coating that protects it from corrosion and does not require painting or maintenance. The portion of road between the two bridges and the approaches will have an 18-foot clear roadway width, and it will be paved with asphalt concrete.

The longer spans will provide for a wider flow area under the bridges that will reduce the backwater elevation, and water velocities. The proposed bridge abutments are located outside of the low-flow active channel ($Q = 450$ feet^3/sec). This will allow the contractor the ability to access and install supports without encroaching upon the low-flow active channel.

Under the proposed action, the Poker Bar bridge abutments will be founded on drilled shafts. Drilled shafts construction will be done using standard equipment and procedures (Contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutment wing walls will be reinforced earth with brick facade.

All material and water required for drilling and installing the drilled shafts will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. The left approach roadway will be raised approximately 10 feet and will have 2:1 side slopes. Slope protection will also be provided on both sides of the right approach roadway to protect the roadway embankment from flows that may overtop and may erode the road.

The road between the two bridges will be raised to elevation 1740.0 feet at the left bridge abutment 2 and transition to elevation 1734.0 feet at the right bridge abutment 1. Slope protection will also be provided on both sides of the road between the two bridges to protect the roadway embankment from flow that may overtop and may tend to wash away the road embankment.

Design Criteria

The following documents were referenced to develop the bridge design:

- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* (Fourth Edition, 2001);
- AASHTO *Standard Specification for Highway Bridges* (16th Edition, 1996, with Interims and Revisions by Caltrans);
- Caltrans and FHWA bridge planning and design manuals;
- Trinity County Design Guidelines, policies and requirements;
- Trinity County's Fire Safe Ordinance;
- *Estimation of 50-and 100-Year Tributary Accretion Floods; Lewiston Dam to Treadwell Bridge, Trinity River, California*, by Scott McBain, McBain and Trush, April 30, 2002;
- *Trinity River Restoration Program – Trinity River Bridge Hydrologic Analysis, Draft Report,* Bureau of Reclamation Technical Service Center, December 2002.

The AASHTO design vehicle, HS20-44, is a three-axle vehicle weighing a total of 36 tons. Structures designed for the HS20-44 design vehicle are capable of carrying any legally loaded vehicles allowed to travel on highways without a permit.

Hydraulics

The longer spans will provide for a wider flow area under the bridges that will reduce the backwater elevation and water velocities. This is a more natural condition than currently occurs in the constricted left channel.

A hydraulic model was developed and calibrated to match measured water surface elevations upstream of the existing bridges using HEC-RAS. The hydraulic analysis indicates that the existing bridges should be replaced with new bridges up- or downstream of the existing bridges. To obtain appropriate water surface elevations for the flows provided in **Table 2-5** for bridges up- or downstream, the HEC-RAS analysis was redone. The new water surface elevations are shown in the following table.

TABLE 2-5 FLOW DISCHARGES AT POKER BAR BRIDGES @ RM = 102.38 NEW BRIDGES, UPSTREAM OF EXISTING BRIDGES TRINITY DAM DISCHARGES PLUS TRIBUTARY FLOWS		
Flow description	**LC = 1732.0 TOD = 1734.5 (cfs)**	**Water Surface Elevations (ft)**
Return Period Peak Flow (Annual with ROD)[a]	Q_{50} = 18,500 Q_{100} = 23,400	El. = 1729.3 El.= 1731.0
Maximum Controlled - Flow Release [b]	Q_{MCR} = 16,900	El. = 1728.7
Estimated flow during 1/1/97 [c]	Q_{1997} = 15,000	El. = 1727.9

Notes:

[a] Return Period Peak Flow – Annual with ROD – Combined winter and spring considering all 5 ROD water years. Includes a possible 11,000 cfs release from Lewiston Dam in the spring.

[b] Maximum Controlled-Flow Release – 13,750 cfs is the maximum controlled release from Trinity Dam. Combining this flow with 100-year May/June peak tributary flow gives the flow value shown.

[c] Scott McBain of McBain and Trush provided flow estimates for the January 1, 1997 flood event.

[d] Lewiston Dam releases to the Trinity River based on the ROD. 450 cfs is the proposed flow release at Lewiston Dam between July 22 and September 15 of each year. 300 cfs is the proposed flow release at Lewiston Dam between October 16 and April 15 of each year.

LC = Bridge low chord, or bottom of beam elevation at lowest point under the bridge.

TOD = Top of Deck elevation. When top of deck elevation varies across the length of the bridge, the value shown in the table is the lowest top of deck elevation.

RM = Trinity River mile.

msl = Elevation above mean sea level (feet).

Q = Flow rate (cfs)

Using water surface elevation 1729.3 for Q_{50} = 18,500 cfs, 2 feet of freeboard, and a 2.5 feet superstructure depth results in a road approach and top of deck elevation of 1733.8 feet. The top of deck elevation will be set at elevation 1734.0, resulting in an approximate low chord elevation of 1731.5 feet. The bridge will also pass the Q_{100} = 23,400 cfs (Annual with ROD), and the Maximum Controlled Release flow, Q_{100} = 16,900 cfs.

Scour Analysis

Geometry for Proposed Action bridges at Poker Bar was used for scour computations. The estimated Q_{100} at this site is 23,400 cfs. HEC-RAS hydraulic computations showed 15,683 cfs traveling down the left channel with the remaining 7,717 cfs passing down the right channel. Because of this lop-sided flow split and the higher resulting depths and velocities, the left channel was determined to be the most critical for scour computations. The substrate d50 values for the computations were collected at the site.

Contraction and abutment scour were computed at the proposed left Poker Bar Bridge for 15,683 cfs. The computed depths of scour were 9.3 ft, 1.0 ft, and 16.6 ft resulting in bottom of scour hole elevations of 1720.0, 1710.0, and 1708.0 msl at the left abutment, thalweg of main channel and right abutment,

respectively. These numbers show that the largest scour depth and lowest scour hole bottom elevation occur at the right abutment.

Geotechnical investigations reveal that a continuous, erosion-resistant, hard conglomerate layer likely exists underneath construction fill and alluvium at the existing left Poker Bar Bridge. At the left abutment, channel thalweg, and right abutment, the approximate elevations of this hard conglomerate layer are 1711.0, 1707.5, and 1707.0 msl, respectively. According to the comparison of these elevations to the estimated bottom of scour hole elevations, the hard conglomerate layer is too deep to control the depth of scour. During the 100 yr event, scour would likely cease before reaching the erosion resistant layer. The safest and recommended method of new bridge construction would be to found all abutments on the hard conglomerate layer that is below the estimated depths of scour.

New abutments will be supported on drilled shafts founded on competent formational strata. Therefore, scour will not be a problem. Drilled shaft tip elevations will extend below potential scour depths.

The stream channel at the Poker Bar Bridges site does not appear to be degrading. Slope protection will be provided at abutment 2 of the left channel bridge and at both abutments for the right channel bridge. The limits and size of the slope protection will be shown on the site plan drawings.

Alignment and Design Speed

The Poker Bar Road and Bridges will be designed for a speed of 25 mph. The proposed roadway alignment from the left approach is set with a 130-foot radius horizontal curve. From this point, the alignment is tangent and straight across the flood plain and ties into the existing alignment approximately 275 feet from the end of the existing right channel bridge (Station 8+10). The proposed alignment length is approximately 810 feet.

Roadway Approaches

The proposed bridges will have an 18-foot clear roadway width and provide two 9-foot lanes. The total structure width including the truss members is 22 feet.

The roadway profile for the Poker Bar Bridges is based on the Caltrans and FHWA hydraulic freeboard guidelines. The application of these guidelines results in 2 feet of freeboard over the 50-year event and the ability to pass the 100-year event. The minimum soffit elevation based on the Hydraulics report is 1731.5 feet. The single span bridges have a superstructure depth of 2.5 feet, and the truss height for the 110-foot span is 9.5 feet.

The proposed alignment from the left approach descends towards the proposed bridges at a grade of 11.5 percent, 2 percent flatter than the existing approach. The grade change is made possible by a 180-foot long vertical curve. The left channel bridge begins at Station 1+82 and the right channel bridge begins at Station 4+52. The proposed left channel bridge is on a descending 4.67 percent grade. A 130-foot vertical curve begins at the end of the left channel bridge and ends at the beginning of the right channel bridge. The right channel bridge top of deck elevation will be at a constant 1734.0 feet elevation. After the end of the right channel bridge, a 60-foot vertical curve is used to tie the new roadway profile to the existing grade. To maintain existing access to Poker Bar, a ramp roughly perpendicular to the proposed alignment will extend approximately 170 feet downstream from the edge of the proposed roadway alignment. The existing posts and cable "gates" will be replaced to limit access to the privately-owned

bar. The existing driveway that provides access to private property will be reconstructed, raised, and have a 7 percent grade. The proposed bridge and roadway require approximately 4,000 cubic yards of imported embankment material.

Bridge Replacement

For the proposed action, the replacement bridges will have an 18-foot clear roadway width and provide two 9-foot lanes. The total structure width including the truss members is approximately 22 feet.

Channel Scour / Slope Protection

Geometry for Proposed Action bridges at Poker Bar was used for scour computations. The estimated Q_{100} at this site is 23,400 cfs. HEC-RAS hydraulic computations showed 15,683 cfs traveling down the left channel with the remaining 7,717 cfs passing down the right channel. Because of this lop-sided flow split and the higher resulting depths and velocities, the left channel was determined to be the most critical for scour computations. The substrate d50 values for the computations were collected at the site.

Contraction and abutment scour were computed at the proposed left Poker Bar Bridge for 15,683 cfs. The computed depths of scour were 9.3 ft, 1.0 ft, and 16.6 ft resulting in bottom of scour hole elevations of 1720.0, 1710.0, and 1708.0 msl at the left abutment, thalweg of main channel and right abutment, respectively. These numbers show that the largest scour depth and lowest scour hole bottom elevation occur at the right abutment.

The geotechnical investigation revealed that a continuous, erosion-resistant, hard conglomerate layer likely exists underneath construction fill and alluvium at the existing left Poker Bar Bridge. At the left abutment, channel thalweg, and right abutment, the approximate elevations of this hard conglomerate layer are 1711.0, 1707.5, and 1707.0 MSL, respectively. According to the comparison of these elevations to the estimated bottom of scour hole elevations, the hard conglomerate layer is too deep to control the depth of scour. During the 100 yr event, scour would likely cease before reaching the erosion resistant layer. The safest and recommended method of new bridge construction would be to found all abutments on the hard conglomerate layer that is below the estimated depths of scour. New abutments will be supported on drilled shafts founded on competent formational strata. Therefore, scour will not be a problem. Drilled shaft tip elevations will extend below potential scour depths.

The stream channel at the Poker Bar Bridges site does not appear to be degrading. Slope protection will be provided at abutment 2 of the left channel bridge and at both abutments for the right channel bridge. The limits and size of the slope protection will be shown on the site plan drawings.

Drainage

For the proposed action, the bridge and roadway profiles will have a crowned cross section, which will provide sufficient gradient for drainage of any surface water. The left approach roadway, the roadway between the bridges and the right approach roadway will be paved. Drainage of the bridge deck will be designed to prevent direct discharge of stormwater from the deck to the live stream.

Right-of-Way

The existing bridges and the proposed bridges are located on private property. Additional permanent easement area both upstream and downstream will be required to accommodate the proposed bridge, roadway alignment and approach fills.

Temporary construction easements on both sides of the proposed bridge will be necessary for construction activities. Permanent easements will be required at all abutment and roadway locations. The recommended easements, existing easement limits, and existing property lines are all shown on **Figure A-3**. Stripping and removal of vegetation will be kept to a minimum, as required in the specifications.

Utilities

No overhead utilities were observed and there does not appear to be any underground utilities in the vicinity of the bridges.

The County does not expect this project to impact the facilities of the Fire District, Water District, Public Utilities District, and telephone service. Future utility access (conduits) can be attached to the steel truss members. New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posting. Rating factors will be calculated and shown on the contract documents.

Bridge Railing and Signing

Approach guard railing will be placed at the both ends of the bridges and along the length of the road between the two bridges. Access to the bar will be provided with a ramp beyond the ends of the approach roadway guardrail. The bridge guardrail will consist of weathering beam supported by steel beams. Approach guardrails will consist of weathering steel beam rail supported by timber posts. Signs will be posted near the left approach to designate that the bridge and road are private. Speed limit signs and other applicable signs will be added on each approach roadway.

Bridge railings must conform to the full-scale crash-test criteria established in NCHRP Report 350. This criterion has established Test Level 2 (TL-2) for roadways with design vehicle speeds of 25 mph. The bridge rail will conform to TL-2.

Construction Criteria and Methods

Specifications

Construction specifications will be developed by Reclamation, and will meet Caltrans Standard Specifications, and the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Construction Process Overview

The following is a list of potential construction activities that may be required for the Proposed Action at the Poker Bar Bridge site. This list is not intended to be a precise or comprehensive construction schedule, and is not intended to show an exact sequence of construction activities. Some of these construction processes may temporarily affect property owner access.

- Construct staging area for installing drilled shafts at abutments. This staging area consists of a level area to allow for equipment set up and installing drilled shafts.

F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Poker_Bar_Easement.mxd Source: NSR, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region; Trinity County 03-11-03 tkoehler

North State Resources, Inc.

Figure A-3. Poker Bar Project Layout & Construction Easements
Trinity River Bridges Project
March 11, 2003

- Construct drilled shafts.
- Construct formwork for abutments.
- Place reinforcement and concrete.
- Assemble and erect prefabricated bridges.
- Construct roadway approaches.
- Tie new roadway approaches onto existing roads.
- Open new bridges and road to traffic.
- Remove existing railroad flatcar bridge superstructures.
- Install slope protection as required.
- Remove existing bridge abutments.

The existing bridges will remain open to traffic and will provide access for homeowners and construction equipment and personnel during construction. Keeping the existing bridge open will minimize impacts to the homeowners. Traffic control will be the provided by the contractor and it is the contractor's responsibility to provide access for the homeowners. Temporary closures of Poker Bar Road, Bridge Road, and the existing bridges may be necessary at times during construction, particularly near the completion of the work (i.e., when tying the new road alignment onto the existing road alignment).

In-River Construction

The proposed bridge abutments will be located outside of the active low-flow channel (Q = 450 cfs). This will allow the contractor the ability to access and install supports without encroaching upon the live river channel.

A seep well will be constructed outside the active low-flow channel to provide construction "make-up" water for all construction activities. A backhoe may be used to excavate and backfill soils at the seep well site. The well will consist of large diameter, perforated pipe placed vertically in the soil to a depth below the groundwater level. The annular space around the pipe will be filled with large aggregate soil to promote groundwater flow to the well. All material and water required for drilling and installing the drilled shafts will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies by contractor to contractor.

Dewatering Activities

Should dewatering be required for construction at the site, the dewatering discharge will be contained in a tank or onsite containment/infiltration basin. In the event that an infiltration basin is used, discharge to the basin will be limited to water/groundwater only and will not be contaminated with deleterious construction byproducts.

Traffic Control / Detour

Temporary closures of Poker Bar Road, Bridge Road, and the bridges may be needed at certain times during construction and near the completion of the work, when tying the new road alignment onto the existing road alignment.

Bridge Demolition

Removal of the existing bridge structures will occur after the new bridges and road are open to traffic. Demolition of the flatcars and pilings may require use of a crane, cutting torches and/or other demolition equipment. The railroad flat cars can be dismantled and salvaged. The existing concrete abutments will be demolished and broken up into pieces that can be easily handled with typical construction equipment, such as a crane and haul trucks. No construction debris resulting from demolition will be allowed to enter the stream. The contractor will be required to dispose of material offsite at an acceptable disposal site determined by the type of material encountered. Any demolition activities that may create lead paint chips will require a lead containment system

Demolition of the flatcars and pilings may require use of a crane, cutting torches and/or other demolition equipment. The selected method of disposition of the existing bridge components (demolition or re-use elsewhere) will determine the amount and type of wastes produced. The following procedures will apply to the contractor's selected demolition and/or removal activities:

- Asphalt and tar waste from the bridge should be recycled.
- Because of the presence of lead paint on the existing bridge structure, none of the painted metal portions of the existing bridges will be sawed, burned, or sanded. If cutting torches are used on painted metal surfaces, contractor will comply with appropriate regulations for safety, disposal and collection of byproducts. If the contractor chooses disposal, the existing bridgework should be disposed of in a properly licensed landfill. Demolition workers should be protected according to the provisions of 8 CCR 1532, "Lead in Construction." Prior to demolition or re-use of the bridge, a licensed lead-based paint removal contractor should remove any loose, lead-based paint that is chipping or peeling from the bridges. The lead waste (paint chips, dust, etc.) should be disposed of appropriately.
- There will likely be some amount of treated wood waste produced. If disposal of treated wood waste is required, it will be disposed of at an appropriate landfill site.

Contractor Staging and Storage Areas

The existing bridges will provide primary site access. Contractor staging areas are expected to be available within the temporary easement areas. Staging areas will be necessary for installing drilled shafts at the new bridge abutments. This staging area will consist of a level area to allow for equipment set up and installing drilled shafts. The temporary construction easement areas are shown in **Figure A-3**. The contractor will be required to place lath, flagging or other suitable markers at the edge of the temporary construction easements to show workmen the limits within which they must stay. These figures identify access routes, roads, borrow areas, and waste sites.

Air Pollution and Dust Control

Efforts will be made to minimize air pollution. BOR specifications require that the contractor comply with all applicable air pollution control rules, regulations, ordinances, and statutes. Contract documents

will specify that the contractor will be responsible to limit dust by watering construction site areas used by trucks and vehicles.

Fill Import and Export

Embankment material is typically a well-graded mixture of clayey sand (SC), sandy lean clay (CL), lean clay (CL), silt (ML), or silty sand (SM). Embankment material gradation typically has a minimum of 20 percent by dry weight, of soil particles passing a No. 200 United States Standard sieve, with a maximum particle size of 4 inches in maximum dimension. The material shall be obtained from on-site excavation or other approved sources and will be free from chemical contamination, vegetation, roots, trash, debris, or other unsatisfactory material. All lumps, clods, and oversize particles shall be removed.

When riprap for slope protection is required, the rock used for riprap shall be hard, dense, and durable. Either quarried rock or boulders may be used for riprap. Since no riprap is available onsite, all material used for slope protection will be imported. The rock in riprap shall be reasonably well graded from the maximum size down to the minimum size as previously shown in **Table 2-2**.

An estimated 4000 cubic yards of embankment material will be required for embankment and structural backfill. This material will be hauled from an approved borrow source. An estimated 1700 cubic yards of riprap will be required for slope protection and abutment protection.

Slope protection will be placed adjacent to each abutment. The left approach roadway will be raised approximately 13 feet and will have 2:1 side slopes. Slope protection will also be provided on both sides of the right approach roadway to protect the roadway embankment from flows that may overtop and erode the road. The road between the two bridges will be raised approximately 7 feet to an elevation of 1737.6 feet at the left bridge abutment 2 and transition to an elevation of 1734.0 feet at the right bridge abutment 1. Slope protection will also be provided on both sides of the road between the two bridges to protect the roadway embankment from flow that may overtop and wash away the road embankment.

Water Pollution Prevention

The contractor shall also implement water pollution control measures that conform to applicable and appropriate permits. The contractor will be required to use extreme care to prevent dirt, debris and miscellaneous demolition byproducts from entering the stream. Some of the key water pollution control measures that shall be implemented are listed below:

- The Contractor shall exercise every reasonable precaution to protect the Trinity River from pollution with fuels, oils, bitumen's, calcium chloride, and other harmful materials and shall conduct and schedule operations to avoid or minimize muddying and silting of the River. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.

- Water pollution control work is intended to provide prevention, control and abatement of water pollution to the Trinity River, and shall consist of constructing those facilities that may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.

- The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary because of the Contractor's operations. The Contractor shall coordinate water pollution control work with all other work done on the contract.

- Before starting any work on the project, the Contractor shall develop an agency-approved program to control water pollution effectively during construction of the project. The program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures that the Contractor proposes to take in connection with construction of the project to minimize the effects of the operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project until the program has been accepted.

- Where erosion that will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.

- Nothing in the terms of the contract shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

The Contractor shall also conform to the following provisions:

- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of the barriers, muddying of streams shall be held to a minimum.

- Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.

- Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.

- Portland cement or fresh Portland cement concrete shall not be allowed to enter flowing water of streams.

- Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.

- Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct work operations that allow free passage of the migratory fish.

Utility Relocation

No utilities will be impacted under this proposal. No relocation will be necessary.

Tentative Schedule

The project schedule is based on a Contract Award in Spring or Summer 2004. Mobilization will occur during Summer 2004 at Poker Bar. The majority of the scheduled work from mobilization to bridge opening would be completed in approximately 200 calendar days.

The work remaining after bridge opening (i.e., removal of existing bridge and abutments, fine grading and revegetation) would occur in the following window for working within the low-flow active channel (June 15 to September 15, 2005). This will require an additional 40 calendar days.

Construction associated with the Trinity River Bridges Project cannot begin until the environmental document has been adopted by Reclamation, BLM, and the County; preparation of final design, plans, specifications, and cost estimates; acquisition of ROW; acquisition of permits; and design approvals from state and federal agencies.

Proposed Action – Biggers Road Bridge

The proposed Biggers Road Bridge will be constructed approximately 137 feet upstream of and parallel to the existing bridge. The bridge will remain on private property and will be owned collectively by homeowners of the "Treadwell Subdivision".

The proposed bridge type is a two-span prefabricated steel truss with reinforced concrete deck. The bridge will be approximately 230 feet long (one 140-foot span and one 90-foot span), with a 10-foot clear roadway width, designed to carry HS20 loading (see Design Criteria). New structures designed for HS20 vehicles are capable of carrying any legal load vehicle and do not require posted limits. The superstructure and guardrail will be fabricated with weathering steel. (High-strength weathering steel develops a surface layer that protects it from corrosion and eliminates the need to maintain standard painted coatings). The pre-project Steelbridge Road profile or vertical alignment begins to overtop when flows reach Q = 15,000 cubic-feet-per-second (cfs). The existing Steelbridge Road profile will remain unchanged except for the area in the immediate proximity of the bridge left approach intersection.

The proposed bridge will be designed for overtopping on the left (east) side, near the intersection of the bridge and Steelbridge Road. Though a small portion of the bridge is subject to overtopping, the Proposed Action avoids construction of roadway improvements, including several hundred feet of retaining wall adjacent to Steelbridge Road. Retaining wall construction would result in significant removal of, and damage to, riparian areas adjacent to Steelbridge Road and the bank of the Trinity River. A turnout area will be provided near the south end of the left abutment, parallel to Steelbridge Road, to allow vehicles to enter and exit Steelbridge Road more safely.

The two-span structure will provide adequate flow area under the bridge, reducing backwater effects and velocities for lower flows. The proposed abutments and single column bent will support the bridge superstructure. The bent will be located outside of the active low-flow channel (Q = 450 cfs) of the Trinity River.

The bent will be a single 3.5-foot by 7-foot column supported by a reinforced concrete footing, anchored to bedrock with drilled steel bar anchors. The bent has a small "foot print," impacts the least amount of area, and is relatively quick to install. It is estimated that a single working platform with an area 24-foot wide by 40-foot long (960 ft^2) will be needed for equipment setup and access for bent construction. Dump trucks may be used to transport material for construction of platform. Bent construction will be done using standard equipment and procedures (contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutments and wing walls will be reinforced concrete and/or reinforced earth structures.

All material and water required for drilling and installation of the steel bar anchors at the bent will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor. Slope protection will be placed adjacent to each abutment. The right approach roadway will be raised approximately 3 feet, and will have 2:1 side slopes. Slope protection will also be provided on both sides of the left approach roadway to protect the roadway embankment from flows that may overtop and may erode the road.

Design Criteria

The following documents were referenced to develop the bridge design:

- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* (Fourth Edition, 2001);
- AASHTO *Standard Specification for Highway Bridges* (16th Edition, 1996, with Interims and Revisions by Caltrans);
- Caltrans and FHWA bridge planning and design manuals;
- Trinity County Design Guidelines, policies and requirements;
- Trinity County's Fire Safe Ordinance;
- *Estimation of 50-and 100-Year Tributary Accretion Floods; Lewiston Dam to Treadwell Bridge, Trinity River, California*, by Scott McBain, McBain and Trush, April 30, 2002;
- *Trinity River Restoration Program – Trinity River Bridge Hydrologic Analysis, Draft Report,* Bureau of Reclamation Technical Service Center, December 2002.

The AASHTO design vehicle, HS20-44, is a three-axle vehicle weighing a total of 36 tons. Structures designed for the HS20-44 design vehicle are capable of carrying any legally loaded vehicles allowed to travel on highways without a permit.

Hydraulics

A U.S. Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) hydraulic model was developed and calibrated to match measured water surface elevations upstream of the existing bridge. **Table 2-6** shows the water surface elevations for the flows being considered at the Biggers Road Bridge site.

The two-span structure will provide for an adequate flow area under the bridge that will reduce the backwater elevation, and water velocities for lower flows. The bridge is designed for overtopping on the left side near the intersection of the bridge approach and Steelbridge Road. Steelbridge Road profile or vertical alignment will remain the same, which begins to overtop at Q = 15,000 cfs. These water surface elevations were calculated with the existing bridge substructure and superstructure in place. Also included in the hydraulic analysis was a determination of the maximum flow that can pass under the existing bridge without obstruction.

The hydraulic analysis also included an estimate of the January 1, 1997 flood flow (the most recent large flood event on the Trinity River), estimated to be 15,000 cfs upstream of the site. There are no significant hydraulic anomalies represented in the hydraulic model that require explanation at this site. An accurate calibration was easily achieved for 5,000 cfs (+/- 0.5 ft) and computed water surface elevations for the January 1, 1997 flood matched well with eyewitness accounts of what actually occurred during this event. The hydraulic analysis shows that the water surface elevation for this flow is 1665.4 feet msl, indicating the bridge superstructure backed up the flow, resulting in flow over the bridge.

The HEC-RAS analysis was repeated to calculate water surface elevations used to develop the proposed action. A review of the flows described in **Table 2-6** suggest that Steelbridge Road and the new bridge will be overtopped at flows in excess of 15,000 cfs.

TABLE 2-6

FLOW DISCHARGES AT BIGGERS ROAD BRIDGE @ RM = 97.35

PROPOSED ACTION BRIDGE

TRINITY DAM DISCHARGES PLUS TRIBUTARY FLOWS

Flow description	**LC = 1664.4** **TOD = 1666.4** **(cfs)**	**Water Surface Elevations (ft)**
Return Period Peak Flow (Spring with ROD)[a]	Q_{50} = 12,300 Q_{100} = 12,500	El. = 1663.4 El.= 1663.5
Return Period Peak Flow (Annual with ROD) [b]	Q_{50} = 19,100 Q_{100} = 24,700	El. = 1668.1 El.= 1669.6
Maximum Controlled - flow Release [c]	Q_{MCR} = 17,200	El. = 1665.8
Estimated flow during 1/1/97 [d]	Q_{1997} = 15,000	El. = 1664.7

Notes:

[a] Retum Period Peak Flow – Annual with ROD – Combined winter and spring considering all 5 ROD water years. Includes a possible 11,000 cfs release from Lewiston Dam in the spring.

[b] Maximum Controlled-Flow Release – 13,750 cfs is the maximum controlled release from Trinity Dam. Combining this flow with 100-year May/June peak tributary flow gives the flow value shown.

[c] Scott McBain of McBain and Trush provided flow estimates for the January 1, 1997 flood event.

[d] Lewiston Dam releases to the Trinity River based on the ROD. 450 cfs is the proposed flow release at Lewiston Dam between July 22 and September 15 of each year. 300 cfs is the proposed flow release at Lewiston Dam between October 16 and April 15 of each year.

LC = Bridge low chord, or bottom of beam elevation at lowest point under the bridge.

TOD = Top of Deck elevation. When top of deck elevation varies across the length of the bridge, the value shown in the table is the lowest top of deck elevation.

RM = Trinity River mile.

msl = Elevation above mean sea level (feet).

Q = Flow rate (cfs)

The water surface elevations at the Treadwell residence (near RM 97.34) are 1666.0 feet msl for Q_{50} = 19,100 cfs and 1668.3 feet msl for Q_{100} = 24,700 cfs. The water surface elevation for Q = 15,000 cfs is approximately 1664.3 msl feet at the Treadwell residence.

Scour Analysis

Foundation exploration has been completed at the bridge site and a preliminary assessment has been made. It is estimated that due to the presence of bedrock outcroppings near the surface, scour will be minimal. New abutments and bents bottom elevations will extend 2 feet below competent rock "surface" and will be anchored to bedrock with drilled and grouted steel bar anchors. Therefore, scour will not be a problem. Slope protection will be provided at both abutments. The limits and size of the slope protection will be shown on the site plan drawings.

Geological data collected at the Biggers Road site indicates that all three existing piers are founded on bedrock. The bedrock is continuous across the entire bridge cross section and it is exposed in several places. Portions of the riverbed are covered with a sediment layer that averages less than 1-foot of depth and consists of large gravel, cobbles, and boulders. There is a pocket of sediment deposits approximately 5 feet deep near pier 3, but it is confined to a small area and the pier seems to be founded on the underlying bedrock. The abutments appear to have about 10 feet of fill above the bedrock layer that could potentially be scoured during a flood event, but the abutments are also anchored to the existing bedrock. Essentially all overlying material (above bedrock) could be removed during a high flow event without significantly changing the cross section shape or compromising the structural integrity of existing Biggers Road Bridge.

The California Department of Water Resources collected cross section survey data in the Trinity River from Lewiston Dam downstream to the Trinity River North Fork confluence during the few years prior to the January 1, 1997 flood. Cross section data in the vicinity of the Trinity River bridges was collected again during the 1999 to 2001 time-period. Comparison of the pre-1997 and post-1997 cross section profile plots indicates that no significant long-term channel degradation resulted from the January 1, 1997 flood. The 1997 flood flow was estimated to be 15,000 ft3/sec at the Biggers Road Bridge. Short term localized scour may have occurred during this event, but was not sufficient to fail any piers or abutments. Sediment deposits from the upstream bed quickly filled in any scour holes that may have developed at or near the bridge during the 1997 flood.

A model of the Proposed Action bridge was analyzed for scour potential. For the Q_{100} flow of 24,700 cfs, the deepest scour hole occurs at the left abutment. Total scour at that location is 21 ft deep resulting in a bottom of scour hole elevation of approximately 1635.0 msl. The total scour depths at the pier and right abutment are approximately 10 ft. The scour hole elevations at the pier and right abutments are approximately 1647.0 and 1657.0 msl, respectively.

Each of these computed scour elevations are well below the estimated elevation of the existing bedrock at the proposed bridge location. Therefore, assuming the Q_{100} flow is powerful enough to remove the rip-rap armor, scour depth would be limited by the existing Abrams Schist bedrock layer across the entire channel.

Alignment and Design Speed

The proposed bridge will be located 137 feet upstream of and parallel to the existing bridge. The intersection of the new bridge alignment with Steelbridge Road is at a ninety-degree angle. Abutment wing walls will extend from the abutment towards Steelbridge Road at forty-five degrees. This configuration allows for vehicles turning from and onto Steelbridge Road, which is only 16 feet wide. A turnout south of the abutment and parallel to Steelbridge Road will be provided to allow vehicles exiting the bridge to merge onto Steelbridge Road. On the right (west) bank of the river, the bridge centerline will be tangent with the existing turn that is currently used to provide access to the private parcels. A new, raised gravel-surfaced driveway (constructed over the existing driveway) will provide access to the Treadwell carport and cabin areas.

Roadway Approaches

The replacement bridge type is an equal two-span, prefabricated steel truss with reinforced concrete deck. The bridge will have a 10-foot clear roadway width and provide a single 10-foot lane. The total structure width including the truss members will be about 14 feet. The replacement bridge will be 234 feet long.

The proposed bridge alignment begins at Steelbridge Road, with a top of deck elevation 1666.4 msl. The bridge profile has a 1.3 percent grade and the top of deck elevation on the right side of the river is 1669.5 msl (to match the existing ground). A turnout area will be provided near the south end of the bridge, parallel to Steelbridge Road.

Bridge Replacement

The replacement bridge will have a 10-foot clear roadway width. The total structure width including the truss members is 14 feet.

Channel Scour / Slope Protection

Foundation exploration has been completed at the bridge site and a preliminary assessment has been made. It is estimated that due to the presence of bedrock outcroppings near the surface, scour will be minimal. New abutments and bents bottom elevations will extend 2 feet below competent rock "surface" and will be anchored to bedrock with drilled and grouted steel bar anchors. Therefore, scour will not be a problem. Slope protection will be provided at both abutments. The limits and size of the slope protection will be shown on the site plan drawings.

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Each of these computed scour elevations are well below the estimated elevation of the existing bedrock at the proposed bridge location. Therefore, assuming the Q_{100} flow is powerful enough to remove the rip-rap armor, scour depth would be limited by the existing Abrams Schist bedrock layer across the entire channel.

New abutments and bents bottom elevations will extend 2 feet below competent rock "surface" and will be anchored to bedrock with drilled and grouted steel anchors. Therefore, scour will not be a problem. Slope protection will be provided at both abutments. The limits and size of the slope protection will be shown on the site plan drawings.

Drainage

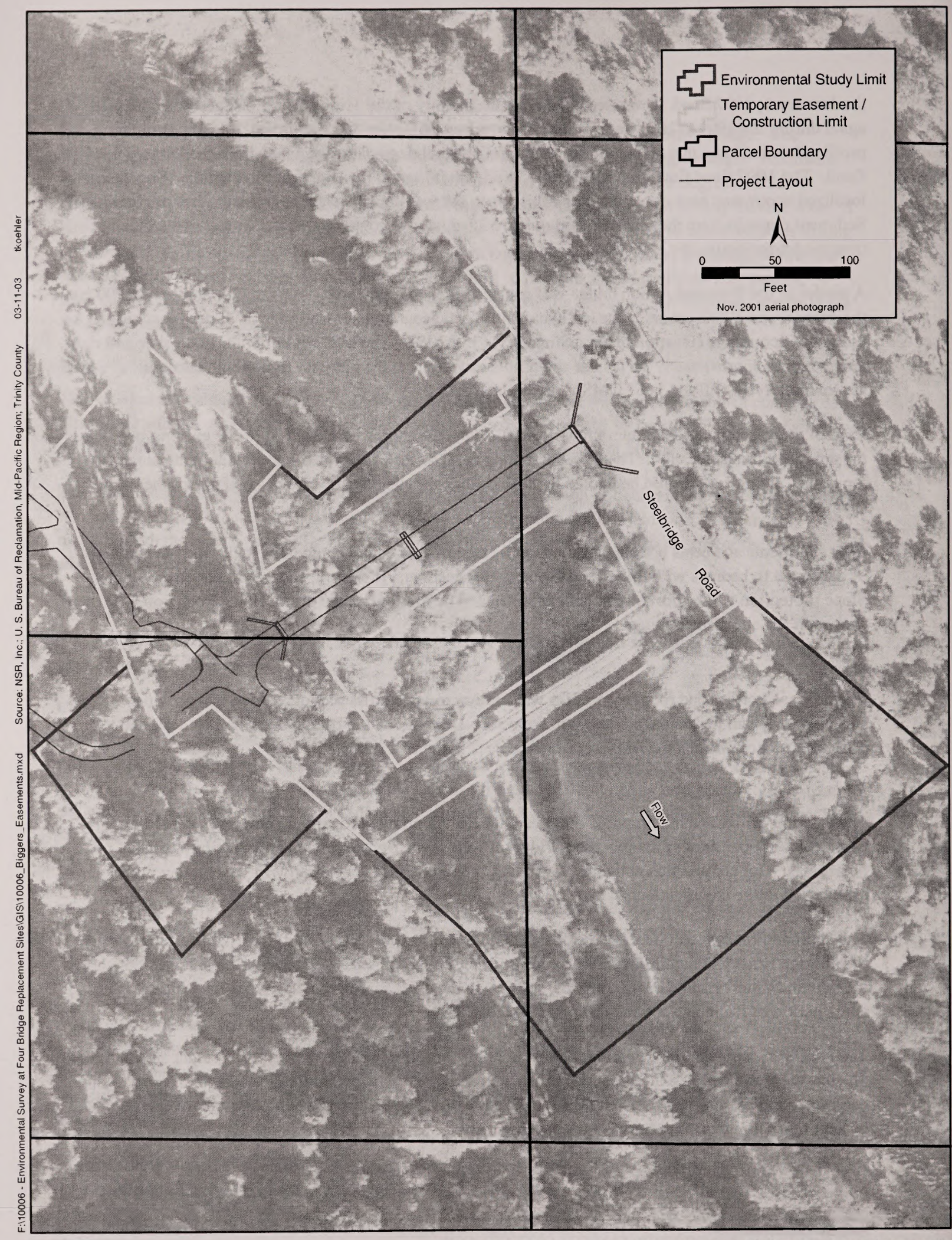
The proposed bridge and roadway profiles will have a crowned cross section, which will provide sufficient gradient for drainage of any surface water. Drainage of the bridge deck will be designed to prevent direct discharge of stormwater from the deck to the live stream.

Right-of-Way

The existing bridge and the proposed bridge are located on private property. Temporary construction easements on both sides of the proposed bridge, as well as the right approach and Steelbridge Road will be necessary for construction activities. Stripping and removal of vegetation will be kept to a minimum, as required in the specifications.

The approach roadway fill on the left side of the river will impact Steelbridge Road. It is estimated that Steelbridge Road will require intermittent daily closures approximately 4 hours per day between the hours of 9 am and 3 pm (assumed periods of low traffic volumes) for approximately two weeks during construction of retaining wall and raising Steelbridge Road.

Temporary construction easements on both sides of the proposed bridge, as well as the right approach and Steelbridge Road will be necessary for construction activities. The recommended temporary construction easement, and existing property lines are shown on **Figure A-4**. Stripping and removal of vegetation will be kept to a minimum, as required in the specifications.



North State Resources, Inc.

Figure A-4. Biggers Road Project Layout & Construction Easements
Trinity River Bridges Project
March 11, 2003

Utilities

No overhead utilities were observed and there does not appear to be any underground utilities in the vicinity of the existing bridge. There is a shallow domestic water well and pump about 20 feet upstream of pier 3 (existing bridge). It is expected that this domestic water well and pump will not be impacted by any construction activities.

Bridge Railing & Signing

Approach guard railing will be placed at the both ends of the bridge. Bridge rail will consist of weathering steel posts and cable. Approach guardrails will consist of weathering steel beam rail supported by timber posts. Signs will be placed at the intersection with Steelbridge Road to designate that the bridge and road are private. Speed limit signs and other applicable signs will be placed on each approach roadway. The post spacing will be such that a vehicle will not crash through the rail and into the river, but flow and debris will be allowed to flow over the portion of the bridge that will be overtopped during higher flows. This type of rail does not meet the crash-test criteria established in NCHRP Report 350; therefore, a waiver of liability will have to be obtained.

Construction Criteria and Methods

Specifications

Construction specifications will be developed by Reclamation, and will meet Caltrans Standard Specifications, and the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Construction Process Overview

The following is a list of potential construction activities required for the Proposed Action at the Biggers Road Bridge site. This list is not intended to be a precise or comprehensive construction schedule, and is not intended to show an exact sequence of construction activities. Some of these construction processes may temporarily affect property owner access.

- Construct staging areas for rock drilling and installation of bent and abutments
- Install temporary shoring/reinforcement at span 3 of existing bridge to enhance construction equipment access to right side of river
- Shaft drilling and construction of formwork for abutments and bent
- Place reinforcement and concrete
- Assemble and erect Steelbridge trusses
- Construct roadway approaches
- Tie new roadway approaches onto existing roads
- Open new bridge and road to traffic
- Remove existing railroad flatcar bridge superstructures

- Install slope protection as required
- Remove existing bridge abutments and piers

The existing bridge will remain open to traffic and provide access for homeowners, construction equipment and personnel during construction. Temporary shoring or reinforcement of span 3 of the existing bridge may be required to enable larger loads to access the right side of the river. Keeping the existing bridge open will minimize impacts to the homeowners. Closing the existing bridge to construct a new bridge along the existing alignment would require a temporary bridge to provide access during construction. The contractor will provide traffic control and it is the contractor's responsibility to maintain access for the homeowners. Temporary closures of the existing Biggers Road Bridge and Steelbridge Road may be necessary at certain times during construction.

In-River Construction

The Proposed Action does not require work within the active low-flow channel except for rip-rap installation and removal of the existing bridge superstructures.

Depending on contractor methods, demolition and removal of pier 2 may require installation of an in-channel access ramp extending from the right bank to the pier. The in-channel ramp/crossing will be constructed on the existing bridge alignment. The ramp will be constructed of clean, washed spawning-size gravels and placed with an upper surface approximately 1 foot below the active low-flow water surface elevation. Estimated quantity of gravel is approximately 60 cubic yards for the approximate 20-foot by 40-foot low-flow channel crossing. Landing mats may be utilized on the ramp surfaces if necessary to support the equipment used. After demolition, the ramp gravel will be distributed/contoured over the adjacent channel bottom.

A seep well will be constructed outside the active low-flow channel to provide construction "make-up" water for all construction activities. A backhoe may be used to excavate and backfill soils at the seep well site. The well will consist of large diameter, perforated pipe placed vertically in the soil to a depth below the groundwater level. The annular space around the pipe will be filled with large aggregate soil to promote groundwater flow to the well.

Dewatering Activities

Should dewatering be required for construction at the site, the dewatering discharge will be contained in a tank or onsite containment/infiltration basin. In the event that an infiltration basin is used, discharge to the basin will be limited to water/groundwater only and will not be contaminated with deleterious construction byproducts.

All material and water required for drilling and installing the bent and abutments will be contained and disposed of off-site by the contractor at an approved and appropriate disposal site. The specifications will instruct the contractor that no cement fines, drilling fluids or contaminated water will be allowed to enter the ground or stream. The containment and disposal system has not been determined, since equipment to do this type of work varies from contractor to contractor.

Pier Construction

The bent will be a single 3.5-foot by 7-foot column supported by a reinforced concrete footing, anchored to bedrock with drilled steel bar anchors. The bent has a small "foot print," impacts the least amount of

area, and is relatively quick to install. It is estimated that a single working platform with an area 24-foot wide by 40-foot long (960 ft^2) will be needed for equipment setup and access for bent construction. Dump trucks may be used to transport material for construction of platform. Bent construction will be done using standard equipment and procedures (contractor's choice) based on type of equipment available. The equipment may be a track dozer and a drill rig. Abutments and wing walls will be reinforced concrete and/or reinforced earth structures. The wingwalls will be reinforced concrete

Traffic Control / Detour

Traffic will be maintained on the existing bridge and roadway alignment as the new bridge is constructed. Single lane closures and staged construction on Steelbridge Road are anticipated to complete the construction of the approach roadway at the east side of the bridge. A minimum of one lane of traffic will be accommodated through the construction site at all times.

Bridge Demolition

The existing bridge will remain open to traffic and provide access for homeowners and construction equipment and personnel during construction. Following completion of new bridge construction, the existing bridge will be removed from the site. The railroad flat cars can be dismantled and salvaged. Demolition of the flatcars and pilings may require use of a crane, cutting torches and/or other demolition equipment. The existing concrete abutments and piers will be demolished and broken up into pieces that can be easily handled with typical construction equipment, such as a crane and haul trucks. No construction debris resulting from demolition will be allowed to enter the stream. The contractor will be required to dispose of material offsite at an acceptable disposal site, dependent on the type of material encountered. Any demolition activities that may create lead paint chips will require a lead containment system

Demolition of the flatcars and pilings may require use of a crane, cutting torches and/or other demolition equipment. The selected method of disposition of the existing bridge components (demolition or re-use elsewhere) will determine the amount and type of wastes produced. The following procedures will apply to the contractor's selected demolition and/or removal activities:

- Asphalt and tar waste from the bridge should be recycled.
- Because of the presence of lead paint on the existing bridge structure, none of the painted metal portions of the existing bridges will be sawed, burned, or sanded. If cutting torches are used on painted metal surfaces, contractor will comply with appropriate regulations for safety, disposal and collection of byproducts. If the contractor chooses disposal, the existing bridgework should be disposed of in a properly licensed landfill. Demolition workers should be protected according to the provisions of 8 CCR 1532, "Lead in Construction." Prior to demolition or re-use of the bridge, a licensed lead-based paint removal contractor should remove any loose, lead-based paint that is chipping or peeling from the bridges. The lead waste (paint chips, dust, etc.) should be disposed of appropriately.
- There will likely be some amount of treated wood waste produced. If disposal of treated wood waste is required, it will be disposed of at an appropriate landfill site.

Contractor Staging and Storage Areas

The existing bridge will provide primary site access. Contractor staging areas are expected to be available within the temporary easement areas. The temporary construction easement areas are shown in

Figure A-4. The contractor will be required to place lath, flagging or other suitable markers at the edge of the temporary construction easements to show workmen the limits within which they must stay. This figure shows access routes, roads, borrow areas, and waste sites. The primary contractor staging area may be located on BLM land just northeast of the existing Bucktail Bridge or other locations within the ESL.

Air Pollution and Dust Control

Efforts will be made to minimize air pollution. BOR specifications require that the contractor comply with all applicable air pollution control rules, regulations, ordinances, and statutes. Contract documents will specify that the contractor will be responsible to limit dust by watering construction site areas used by trucks and vehicles.

Fill Import and Export

Embankment material is typically a well-graded mixture of clayey sand (SC), sandy lean clay (CL), lean clay (CL), silt (ML), or silty sand (SM). Embankment material gradation typically has a minimum of 20 percent by dry weight, of soil particles passing a No. 200 United States Standard sieve, with a maximum particle size of 4 inches in maximum dimension. The material shall be obtained from on-site excavation or other approved sources and will be free from chemical contamination, vegetation, roots, trash, debris, or other unsatisfactory material. All lumps, clods, and oversize particles shall be removed.

When riprap for slope protection is required, the rock used for riprap shall be hard, dense, and durable. Either quarried rock or boulders may be used for riprap. Since no riprap is available onsite, all material used for slope protection will be imported. The rock in riprap shall be reasonably well graded from the maximum size down to the minimum size as previously shown in **Table 2-2**, Rock Sizes and Riprap Thickness.

An estimated 325 cubic yards of embankment material will be required for embankment and structural backfill at the Biggers Road Bridge site. This material will be hauled from an approved borrow source. An estimated 450 cubic yards of riprap (21-inch maximum size) will be required for slope protection and abutment protection. Slope protection will be placed adjacent to each abutment.

Water Pollution Prevention

The contractor shall also implement water pollution control measures that conform to applicable and appropriate permits. The contractor will be required to use extreme care to prevent dirt, debris and miscellaneous demolition byproducts from entering the stream. Some of the key water pollution control measures that shall be implemented are listed below:

- The Contractor shall exercise every reasonable precaution to protect the Trinity River from pollution with fuels, oils, bitumen's, calcium chloride, and other harmful materials and shall conduct and schedule operations to avoid or minimize muddying and silting of the River. Care shall be exercised to preserve roadside vegetation beyond the limits of construction.
- Water pollution control work is intended to provide prevention, control and abatement of water pollution to the Trinity River, and shall consist of constructing those facilities that may be shown on the plans, specified herein or in the special provisions, or directed by the Engineer.
- The Contractor shall provide temporary water pollution control measures, including but not limited to, dikes, basins, ditches, and applying straw and seed, which become necessary because of the

Contractor's operations. The Contractor shall coordinate water pollution control work with all other work done on the contract.

- Before starting any work on the project, the Contractor shall develop an agency-approved program to control water pollution effectively during construction of the project. The program shall show the schedule for the erosion control work included in the contract and for all water pollution control measures that the Contractor proposes to take in connection with construction of the project to minimize the effects of the operations upon adjacent streams and other bodies of water. The Contractor shall not perform any clearing and grubbing or earthwork on the project until the program has been accepted.

- Where erosion that will cause water pollution is probable due to the nature of the material or the season of the year, the Contractor's operations shall be so scheduled that permanent erosion control features will be installed concurrently with or immediately following grading operations.

- Nothing in the terms of the contract shall relieve the Contractor of the responsibility for compliance with Sections 5650 and 12015 of the Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

The Contractor shall also conform to the following provisions:

- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during construction of the barriers, muddying of streams shall be held to a minimum.

- Water containing mud or silt from aggregate washing or other operations shall be treated by filtration, or retention in a settling pond, or ponds, adequate to prevent muddy water from entering live streams.

- Oily or greasy substances originating from the Contractor's operations shall not be allowed to enter or be placed where they will later enter a live stream.

- Portland cement or fresh Portland cement concrete shall not be allowed to enter flowing water of streams.

- Material derived from roadway work shall not be deposited in a live stream channel where it could be washed away by high stream flows.

- Where there is possible migration of anadromous fish in streams affected by construction on the project, the Contractor shall conduct work operations that allow free passage of the migratory fish.

Utility Relocation

No utilities will be impacted under this proposal. No relocation will be necessary.

Tentative Schedule

The project schedule is based on a Contract Award during Summer 2003. Mobilization would begin during the summer at this site. The majority of the scheduled work from mobilization to bridge opening would be completed in approximately 220 calendar days.

The work remaining after bridge opening (i.e., removal of existing bridge, abutments and piers, fine grading and revegetation) would occur in the following window for working within the low-flow active channel (June 15 to September 15, 2005). This will require an additional 50 calendar days at this site:

Construction associated with the Trinity River Bridges Project cannot begin until the environmental document has been adopted by Reclamation, BLM, and the County; preparation of final design, plans, specifications, and cost estimates; acquisition of ROW; acquisition of permits; and design approvals from state and federal agencies.

APPENDIX B

Draft Riparian Habitat Mitigation and Monitoring Plan

TRINITY RIVER BRIDGES PROJECT

Riparian Habitat Mitigation and Monitoring Plan

March 2003

Prepared for:

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TRINITY RIVER BRIDGES PROJECT

Riparian Habitat Mitigation and Monitoring Plan

1.0 Introduction

The Trinity River Restoration Program (TRRP) through its lead agencies, the United States Department of Interior – Bureau of Reclamation (Reclamation), United States Department of Interior – Bureau of Land Management (BLM) and Trinity County (County), have proposed to improve four bridges over the Trinity River in order to accommodate 11,000 ft^3/s releases from Lewiston Dam and associated tributary accretions. Reclamation will be the action agency responsible for implementation of the prescribed mitigation measures.

The Trinity River flows in a generally southerly direction through the project site to its confluence with the Klamath River approximately ninety-seven miles downstream of the project site. The Trinity River and its headwater tributaries originate in the rugged Salmon-Trinity Mountains of northwest California, at a point approximately 10 miles southwest of the town of Weed, California.

This Riparian Habitat Mitigation and Monitoring Plan (Mitigation Plan) is prepared to meet project-related mitigation measures for biological resources, specifically the loss of montane riparian vegetation / shaded riverine aquatic (SRA) habitat along the Trinity River. This Mitigation Plan is also prepared to meet requirements of the U.S. Army Corps of Engineers (ACOE) Clean Water Act, Section 404 permit and the National Marine Fisheries Service (NMFS) for potential effects on designated critical habitat for the federally-threatened Southern Oregon / Northern California Coasts (SONCC) ESU coho salmon.

2.0 Project Location and Setting

Salt Flat Bridge

The project area includes the approximately 9.11-acre Environmental Study Limits (ESL) and the surrounding action area in immediate proximity to the ESL. The ESL includes the Salt Flat Road crossing on the Trinity River, the in-channel flood plain, portions of six privately owned parcels, and a portion of BLM-owned land. The project is located in a rural area approximately 1.5 miles west of the northern California community of Lewiston. Salt Flat Road and the existing bridge provide access from Goose Ranch Road west to rural residences. The elevation at the project site is approximately 1773' mean sea level (msl).

Bucktail Bridge

The project area includes the approximately 13.71-acre ESL and the surrounding action area in immediate proximity to the ESL. The ESL includes the Browns Mountain Road crossing on the Trinity River, the in-channel flood plain, portions of ten privately owned parcels, and portions of BLM land that include a rock quarry and Klamath mixed conifer upland habitat. The project is located in a rural area approximately 0.25 miles northeast of Lewiston Road. Browns Mountain Road and the existing bridge provide access from State Highway 299 north to rural residences and BLM-owned public access points to the Trinity River. The elevation at the site is approximately 1751' msl.

Poker Bar Bridge

The project area includes the approximately 7.85-acre ESL and the surrounding action area in immediate proximity to the ESL. The ESL includes the Poker Bar bridge crossing on the Trinity River, the in-channel floodplain, portions of the Ross, Mason, Martin, Cole, and White properties, which are predominantly unvegetated. The project is located in a rural area 1.5 miles north of State Highway 299 in Trinity County, about halfway between the towns of Lewiston and Douglas City. Bridge Road and the existing bridges provide access from State Highway 299 to seventy-seven (77) rural residences and undeveloped parcels to the north. The elevation at the project site is approximately 1721' msl.

Biggers Road Bridge

The project area includes the approximately 3.82-acre ESL and the surrounding action area in immediate proximity to the ESL. The ESL includes the bridge crossing on the Trinity River, the in-channel flood plain, portions of Steelbridge Road, and portions of two private properties. The project is located in a rural area 3 miles east of Douglas City in Trinity County. Biggers Road and the existing bridge provide access from Steelbridge Road to rural residences located on the right (west) side of the Trinity River. The elevation at the project site is approximately 1659' msl.

3.0 Riparian Habitat Mitigation Plan

3.1 Responsible Parties

As the project applicant and responsible party, TRRP is responsible for all associated implementation and monitoring components contained in this plan. Some activities may be delegated to contractors at the discretion of TRRP an Reclamation.

3.2 Schedule

Implementation of the Mitigation Plan will occur during the late-fall through early-spring following construction (i.e., time of impact). For example, if construction is conducted at the Salt Flat Bridge Project site during late-fall 2003, riparian planting will occur during the following late-winter planting season in 2004 (assuming plant stock is available).

3.3 Location and Size of Mitigation Area

The riparian habitat mitigation areas are comprised entirely of on-site locations located within the project ESL's. Provided below are descriptions of the riparian impacts (**Table B-1**) and proposed mitigation areas for each bridge location:

Salt Flat Bridge

Specifically, the areas associated with the abutments and piers of the old, existing bridge will be restored upon removal of the old bridge structure to compensate for loss of montane riparian and SRA habitat. The mitigation objective will be a 1:1 areal and plant replacement. These areas are located directly upstream or directly downstream of the new bridge structure, depending on the type and method of construction. If necessary, additional areas along the river may be used for mitigation plantings. Up to 1.16-acres of on-site mitigation area may be required to compensate for the loss of riparian habitat (1.054-acre temporarily impacted, 0.106-acre permanently impacted). Of this amount, only 0.293-acre is SRA-associated riparian wetland. However, the entire riparian area is not vegetated at this site, and mitigation

is proposed to occur at a 3:1 planting ratio per woody riparian plant removed during construction, so the entire 1.16-acres of mitigation area may not be necessary.

TABLE B-1
SUMMARY OF IMPACTS TO RIPARIAN HABITAT BY BRIDGE SITE (acres)

	Salt Flat Bridge	Bucktail Bridge	Poker Bar Bridge	Bigger's Road Bridge
Permanent Impacts				
Montane riparian wetland (contributing to SRA habitat)	0.022	0.000	0.055	0.006
Montane riparian upland	0.084	0.027	0.149	0.008
Seasonal wet meadow	0.000	0.003	0.000	0.000
Freshwater emergent wetland	0.000	0.000	0.000	0.000
Total:	***0.106***	***0.030***	***0.204***	***0.014***
Temporary Impacts				
Montane riparian wetland (contributing to SRA habitat)	0.271	0.081	0.150	0.205
Montane riparian upland	0.783	0.327	1.064	0.098
Seasonal wet meadow	0.000	0.165	0.000	0.000
Freshwater emergent wetland	0.000	0.037	0.000	0.000
Total:	***1.054***	***0.610***	***1.214***	***0.303***

Bucktail Bridge

Specifically, the areas associated with levee and roadway construction will be restored upon completion of these improvements to compensate for losses or impacts to montane riparian, emergent wetland, and seasonal wet meadow habitat (note: no SRA habitat is expected to be permanently lost under the Proposed Action). The mitigation objective will be a 1:1 areal and plant replacement. These areas are located directly upstream or directly downstream of the new bridge structure, depending on the type and method of construction. If necessary, additional areas along the river may be used for mitigation plantings. Up to 0.640-acre of on-site mitigation area may be required to compensate for the loss of riparian habitat (0.610-acre temporarily impacted, 0.03 acre permanently impacted). Of this amount, only 0.081-acre is temporarily impacted SRA-associated riparian wetland. However, the entire riparian area is not vegetated at this site, and mitigation is proposed to occur at a 3:1 planting ratio per woody riparian plant removed during construction, so the entire 0.604-acre of mitigation area may not be necessary.

Poker Bar Bridge

Specifically, the areas associated with the abutments of the old, existing bridges will be restored upon removal of the old bridge structure to compensate for losses or impacts to montane riparian/SRA habitat. The mitigation objective will be a 1:1 areal and plant replacement. These areas are located directly upstream or directly downstream of the new bridge structure, depending on the type and method of construction. If necessary, additional areas along the river may be used for mitigation plantings. Up to 1.418-acres of on-site mitigation area may be required to compensate for the loss of riparian habitat (1.214-acres temporarily impacted, 0.204-acre permanently impacted). Of this amount, only 0.205-acre is SRA-associated riparian wetland. However, the entire riparian area is not vegetated at this site, and

mitigation is proposed to occur at a 3:1 planting ratio per woody riparian plant removed during construction, so the entire 1.418-acres of mitigation area may not be necessary.

Biggers Road Bridge

Specifically, the areas associated with the abutments and piers of the old, existing bridge will be restored upon removal of the old bridge structure to compensate for losses or impacts to montane riparian/SRA habitat. The mitigation objective will be a 1:1 areal and plant replacement. These areas are located directly upstream or directly downstream of the new bridge structure, depending on the type and method of construction. If necessary, additional areas along the river may be used for mitigation plantings. Up to 0.317-acre of on-site mitigation area may be required to compensate for the loss of riparian habitat (0.303-acre temporarily impacted, 0.014-acre permanently impacted). Of this amount, only 0.211-acre is SRA-associated riparian wetland. However, the entire riparian area is not vegetated at this site, and mitigation is proposed to occur at a 3:1 planting ratio per woody riparian plant removed during construction, so the entire 0.0.317-acre of mitigation area may not be necessary.

3.4 Site Preparation and Design

In conjunction with the objectives set forth by the TRRP, Reclamation will implement riparian restoration and monitoring measures in a manner consistent with other channel rehabilitation and riparian restoration projects planned for the Trinity River.

Salt Flat Bridge

The on-site mitigation will occur within the project footprint areas disturbed by construction activities, specifically the area associated with the old bridge abutments. Site preparation for planting is expected to be minor following completion of the new bridge. Riparian hardwood cuttings will be planted in rows along the stream corridor. Plant spacing intervals will be determined as appropriate based on site conditions following construction. To achieve the mitigation success criteria (discussed below), a replacement ratio of 3:1 per woody riparian plant removed due to construction (for both permanent and temporary impacts) will be planted within the on-site areas.

Bucktail Bridge

The on-site mitigation will occur within the project footprint areas disturbed by construction activities, specifically the area associated with project construction activities. Site preparation for planting is expected to be minor following these activities. Riparian hardwood cuttings will be planted in rows along the stream corridor. Plant spacing intervals will be determined as appropriate based on site conditions following construction. To achieve the mitigation success criteria (discussed below), a replacement ratio of 3:1 per woody riparian plant removed due to construction (for both permanent and temporary impacts) will be planted within the on-site areas.

Poker Bar Bridge

The on-site mitigation will occur within the project footprint areas disturbed by construction activities, specifically the area associated with the old bridge abutments. Site preparation for planting is expected to be minor following completion of the new bridges. Riparian hardwood cuttings will be planted in rows along the stream corridor. Plant spacing intervals will be determined as appropriate based on site conditions following construction. To achieve the mitigation success criteria (discussed below), a replacement ratio of 3:1 per woody riparian plant removed due to construction (for both permanent and temporary impacts) will be planted within the on-site areas.

Biggers Road Bridge

The on-site mitigation will occur within the project footprint areas disturbed by construction activities, specifically the area associated with the old bridge abutments and approaches. Site preparation for planting is expected to be minor following completion of the new bridge. Riparian hardwood cuttings will be planted in rows along the stream corridor. Plant spacing intervals will be determined as appropriate based on site conditions following construction. To achieve the mitigation success criteria (discussed below), a replacement ratio of 3:1 per woody riparian plant removed due to construction (for both permanent and temporary impacts) will be planted within the on-site areas.

3.5 Plant Species

Non-native species removed during project construction will be replaced with native riparian species. Riparian species that have been recorded along the Trinity River, within the project area include: white alder (*Alnus rhombifolia*); Arroyo willow (*Salix lasiolepis*); and black cottonwood (*Populus balsamifera*). The specific species list will be revised to reflect the riparian species observed by NSR in consultation with Reclamation. Reclamation will integrate information from other restoration efforts within the basin to assure a consistent approach to revegetation at these sites.

Plants used for the riparian habitat mitigation may include both rooted container stock and hardwood cuttings. Container stock size will likely be 4" x 14" "deepots" and/or one-gallon stock sizes. Hardwood cuttings will be obtained from within the project area(s), and other nearby sources. Rooted container stock will be purchased from appropriate native plant nurseries and/or obtained using a contract grower to propagate plant stock.

3.6 Planting Design and Technique

Prior to construction, Reclamation will provide a qualified biologist to count and identify riparian tree and shrub species that would be removed to accommodate construction of a new bridge and roadway approaches. As previously discussed, for each woody riparian plant that will be removed as a result of project construction, three seedlings/cuttings shall be planted in the mitigation area. Prior to planting, the specific location of each riparian vegetation planting area will be marked in the field by Reclamation (or their representative) with stakes, flagging, or other appropriate methods. Reclamation, or their representative, will review the planting techniques and design in the field prior to initiation of planting work to insure consistency with TRRP riparian restoration goals. General planting guidelines and techniques for riparian species are presented below for both rooted (potted) stock and hardwood cuttings. As previously described, the specific type of plant stock used will vary by site suitability conditions and/or location. If potted plant stock is used, a 6-20-20 fertilizer should be added during planting. This fertilizer is high in phosphate and potassium, while low in nitrogen, and encourages root development, disease resistance, vigor, and strong above ground stems without producing a large quantity of succulent branches and leaves. This will increase the water absorption ability of the plant by roots, while minimizing transpiration of water through leaves.

Protective plant covers will be placed around each planting (potted or cutting) and staked or secured as appropriate. These covers will be the solid tube variety (e.g., Blue-x), three to five inches in diameter, and 18" in height. Each tube will be placed two to three inches into the ground (if possible without causing root damage) to cover the base of the plant, with the remainder of the tube extending up the plant. If necessary to fit the plant inside the protective tube, use sharp hand pruners to cut back new growth to the diameter of the tube.

Potted plant stock will be planted generally following the techniques described below:

- Following location of the appropriate planting site, excavate a hole twice the diameter and one and one-half the depth of the plant container.
- Scarify the sides of the hole to loosen soil along the edges and backfill the bottom portion of the hole with loose soil.
- Evenly spread approximately one-fourth cup of 6-20-20 fertilizer into the hole.
- Place plants in the hole within the backfill soil so that the top of the root ball will be level to, or slightly above the ground level.
- Complete backfilling the hole around the root ball, making sure to pack the soil to break-up large pieces and air pockets. Backfill the hole with soil and construct a four-inch high, 30-inch diameter basin around each plant. Irrigate the planting to settle the soil.
- Apply three inches of mulch or shredded bark around each plant and place a protective cover over each plant and secure appropriately.
- If necessary, trim new plant growth with sharp hand pruners to fit plant into tube.
- Place a wooden stake or other appropriate marker adjacent to the plant to aid in location during future maintenance and monitoring.

Hardwood cuttings will be obtained and planted in a manner consistent with TRRP riparian restoration goals generally following the techniques described below:

- Hardwood cuttings will be collected from large, vigorously growing trees and/or shrubs following leaf drop in the fall, and prior to bud swelling in the early spring.
- Hardwood cuttings will be approximately three-feet in length with a minimum width of one and one-half inches at the cut base. Each cut should be made at an approximately 45-degree angle to the stem. The terminal end cut should be horizontal to the stem to aid in correct orientation and facilitate planting.
- Prior to planting, each cutting shall be treated with a rooting hormone and fungicide, such as hormodin powder, by dipping the basal 2/3 of the cutting. Each cutting will then dry to minimize the loss of rooting hormone through handling and planting.
- If it is necessary to store cuttings prior to planting, they shall be wrapped with a moist covering covered by a dry covering (e.g., moist sawdust in a plastic bag, or stored immersed in water. Cuttings should not be stored for longer than one week.
- If possible, hardwood-planting holes will be augured six to ten inches in diameter to a maximum depth of 36 inches. Place the cutting into the hole with six to eight inches of the cutting above the ground surface. Backfill the hole with soil and construct a four-inch high, 30 inch diameter basin around each plant. Irrigate the planting to settle the soil.
- Apply three inches of mulch or shredded bark around each plant and place a protective cover over each plant and secure appropriately.

- Be sure each plant has an appropriate identification label or tag. Place a wooden stake marker adjacent to the plant to aid in location during future maintenance and monitoring.

The ultimate planting design goal is for the planting area to exhibit a vegetation species composition and natural pattern of growth consistent with the TRRP riparian restoration and channel rehabilitation objectives for a healthy alluvial river, modified only to provide for long-term bank stability near bridge abutments.

3.7 Maintenance

Maintenance may be required for the riparian plantings and will consist of periodic weeding to reduce competition and aid root establishment. If necessary, maintenance will be conducted by the Reclamation and/or their contractor three times per year for the first two to three years, and will not be required upon successful plant establishment. Timing of maintenance will be spring, summer, and fall. Due to existing conditions and the ground disturbance caused by project construction, conditions within the mitigation area will be ideal for establishment of invasive, noxious weed species. Maintenance during the first and second growing seasons may be critical to the success of the riparian plantings, as competition from weeds may be prevalent.

3.8 Plant Storage

Suitable plant storage facilities will be determined prior to site planting. Timing of plant stock delivery will coincide closely with planting to minimize the plant storage period and avoid damage or stress to the plants. Water and protective measures against potentially damaging factors such as weather or animal damage will be provided at the storage location. Planting will be conducted over a reasonable time-line to minimize the plant storage period.

3.9 Irrigation Requirements

On-site riparian mitigation areas planted with hardwood cuttings will not require irrigation, as they will be planted to the depth of the water table.

4.0 RIPARIAN HABITAT RESTORATION MONITORING

The goal of the riparian restoration area is to be self-sustaining, eliminating the need for irrigation. However, short-term irrigation (and associated maintenance) may be required if the planting stock does not appear to be receiving sufficient water to become established.

Riparian habitat mitigation performance will be monitored throughout the planting effort to assure that installation is conducted to final specifications. Mitigation monitoring will be initiated immediately following completion of the planting, and extend for a period of three years. If requested by the resource agencies, Reclamation shall provide copies of the annual monitoring reports. Once the riparian mitigation effort has been completed, Reclamation shall submit a final memorandum (including photo documentation) to ACOE, CDFG, and NMFS documenting the successful results.

4.1 Success Criteria

Following completion of the riparian planting area, a three-year mitigation-monitoring program will be initiated. For determination of successful restoration, the following success criteria will be met over the three-year period:

- Within the on-site riparian habitat areas, no more than 60 percent mortality of planted species (either container stock and/or hardwood cuttings) following the first two growing seasons.

5.0 REMEDIAL MEASURES

If the success criteria are not achieved, Reclamation and/or their representative will develop appropriate remedial measures. As the success criteria are structured by plant survival and vigor, likely remedial measures would include additional vegetation plantings. Information gathered during the monitoring period will be used to best determine the appropriate remedial measures.

If it appears that the success criteria will not be met following two growing seasons, remedial measures consisting of a supplemental planting effort will be implemented. A detailed planting plan will be developed with the goal of achieving the success criteria. For the best results, all remedial measures, including the planting plan, should be developed as appropriate based on information gathered during the mitigation monitoring period.

APPENDIX C

U.S. Fish and Wildlife Service (USFWS) Species Letter

United States Department of the Interior

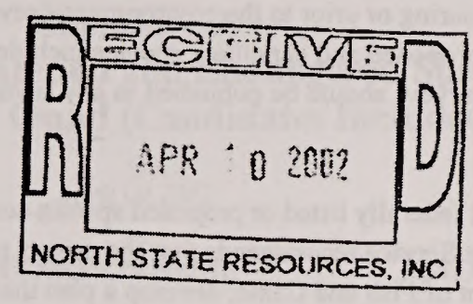
FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201
FAX (707) 822-8136

IN REPLY REFER TO:

1-14-2002-1083

April 9, 2002



Mr. Paul Uncapher
c/o North State Resources
5000 Bechelli Ln, Suite 203
Redding, CA 96002

Subject: Species Lists for Proposed Bridge Rehabilitation/Replacement, Trinity County, California

Dear Mr. Uncapher:

The enclosed lists are in reply to your electronic message dated April 8, 2002, requesting information about the endangered and threatened species that may be present in your project area (see Enclosure A). Information concerning the distribution, life history, and habitat requirements for the listed species is available upon request.

The Fish and Wildlife Service (Service) used your map(s) and/or other information to determine the U.S.G.S. 7.5' quadrangle(s) containing the proposed project. The species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within* the Weaverville, Lewiston, Helena, and Dedrick quads.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action.

Additional information concerning listed and candidate species in California are available from the California Natural Diversity Data Base, a program of the California Department of Fish and Game. Address your request to: Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814 (916)322-2493.

All listed species identified in Enclosure A are fully protected under the mandates of the Endangered Species Act of 1973, as amended (Act). Section 9 of the Act and its implementing regulations prohibit the "take" of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such wildlife species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency

is involved with the permitting, funding, or carrying out of this project, then initiation of formal consultation between that agency and the Service pursuant to section 7 of the Act is required if it is determined that the proposed project may affect a federally listed species. Such consultation would result in a biological opinion that addresses anticipated effects of the project to listed and proposed species and may authorize a limited level of incidental take. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an "incidental take" permit pursuant to section 10(a) of the Act should be obtained. The Service may issue such a permit upon completion by the permit applicant of a satisfactory conservation plan for the listed species that would be affected by the project.

If suitable habitat for federally listed species exists in the project area, we recommend that surveys for them be undertaken by qualified biologists during or prior to the environmental review process. We also recommend that surveys be undertaken for the proposed and candidate species included in Enclosure A if suitable habitat exists on site. The results of these surveys should be published in any environmental documents prepared for this project.

Should these surveys determine that federally listed or proposed species occur in the area and are likely to be affected by the proposed project, the Service recommends that the project proponent, in consultation with this office and the California Department of Fish and Game, develop a plan that mitigates for the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. The mitigation plan also should be included in the environmental document.

We also recommend addressing adverse impacts to candidate species. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing as endangered or threatened. One of the benefits of considering these species early in the planning process is that by exploring alternatives, it may be possible to avoid conflicts that could develop, should a candidate species become listed before the project is complete.

We appreciate your concern for endangered species. If you have further questions, please call Mr. Greg Goldsmith of this office at (707) 822-7201. For the fastest response to species list requests, address them to the attention of the species list coordinator at this address. For questions regarding wetlands, please contact Mr. Randy Brown of this office at (707) 822-7201.

Sincerely,

Bruce G. Halstead

Bruce G. Halstead
Project Leader

Enclosure

Enclosure A
Listed/Proposed Threatened and Endangered Species for the LEWISTON Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus tshawytscha*	winter-run chinook salmon	E	Y
	Pogonichthys macrolepidotus	Sacramento splittail	T	N
	Hypomesus transpacificus	delta smelt	T	Y
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the WEAVERVILLE Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the HELENA Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the DEDRICK Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

APPENDIX D

Site Photographs

Appendix D1: Site Photographs – Salt Flat Bridge Site
Trinity River Bridges Project

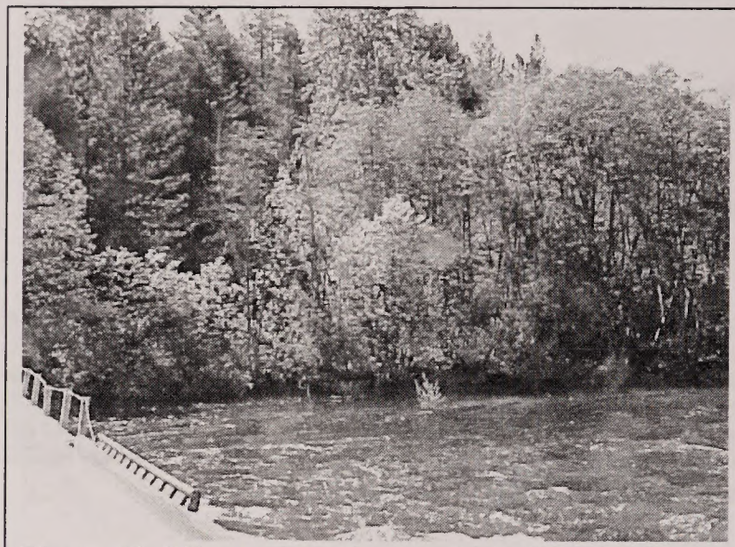


Photo #1: View of northwest side of Trinity River with adjacent riparian and upland communities, looking upstream (Owl calling station #2 is at the riparian/upland interface pictured on the right)

Photo #2: View of southwest side of Trinity River, looking downstream

Photo #3: Downstream view of the center island community

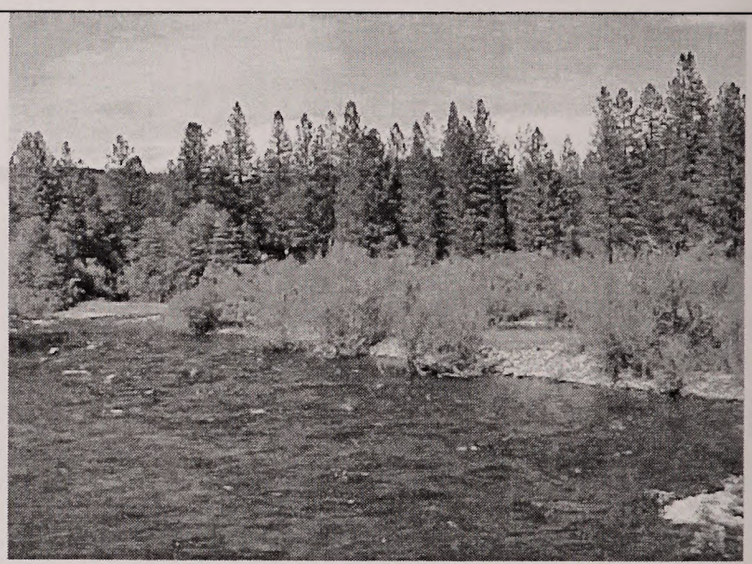


Photo #4: Upstream view of the center island community (foreground)

Photo #5: View of northeast side of Trinity River looking upstream.

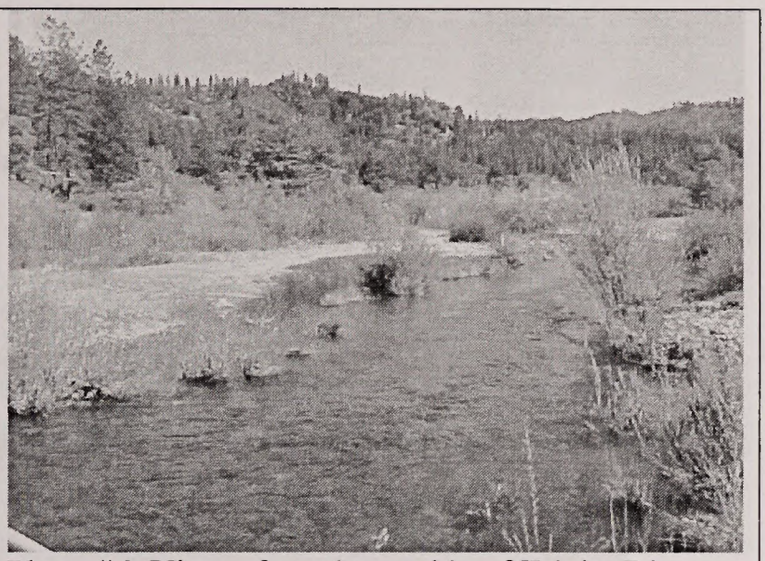


Photo #6: View of southeast side of Trinity River (and east side of center island community) looking downstream.

Photo #7. Bridge approach, facing residences west of the Trinity River.

Appendix D2: Site Photographs – Bucktail Bridge Site
Trinity River Bridges Project

Photo #1: View of east side of Trinity River and the riparian corridor from the center of the bridge, looking upstream

Photo #2: View of west side of Trinity River and residences from the center of the bridge, looking upstream (note scanty conifer cover on surrounding hillslopes)

Photo #3: View of west side of river and adjacent riparian corridor, looking downstream (from center of bridge)

Photo #4: View of east side of river looking downstream (from center of bridge)

Photo #5: Downstream view, taken from the site in Photo 4.

Photo #6. Standing on culvert, looking North.

Photo #7. Standing on the culvert/road looking south.

Photo #8. Standing on the culvert, looking west toward the Browns Mountain Rd. and Salmon Rd. intersection (on right).

Photo #9. Standing on culvert, looking east.

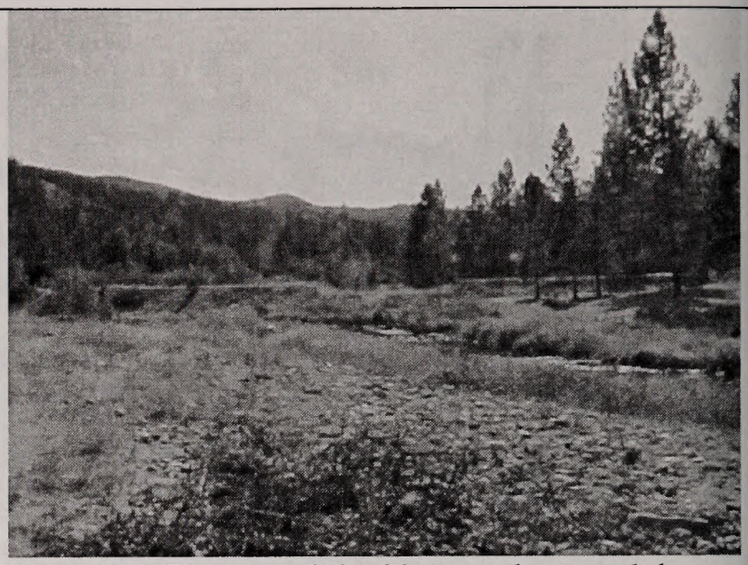


Photo #10. Photograph looking south toward the existing berm, from upstream.

Photo #11. Looking downstream toward bridge from the bank north of the roadway.

APPENDIX G

Wild & Scenic River Act Section 7 Determination

APPENDIX G

WILD AND SCENIC RIVER, SECTION 7ANALYSIS AND DETERMINATION

INTRODUCTION

Federal protection of this section of the Trinity River in the Wild and Scenic System was completed in order to preserve the free-flowing condition, anadromous and resident fisheries, outstanding geologic, The Trinity River is designated for its outstandingly remarkable anadromous fishery values (its Outstandingly Remarkable Value - ORV) and has a Recreational River classification in the Project (Cedar Flat to Lewiston Dam) segment.

This analysis and subsequent determination evaluates the effects of the proposed project (Trinity River Bridges) on the Trinity River's free-flowing attributes and ORV, and ensures their protection as required under Section 7 of the Wild and Scenic Rivers Act. Due to the level of detail provided in the DEA/EIR, this analysis is presented in a summary format and refers the reader to the specific sections of Chapter 2, 3 and 4 of the DEA/EIR for additional information on water quality, fisheries, wildlife, flora and fauna, recreational, and aesthetic values.

SECTION 7 ANALYSIS

This analysis and determination follows the Evaluation Procedure presented in Appendix C of the Technical Report of the Interagency Wild and Scenic Rivers Coordinating Council, Wild and Scenic Rivers Act: Section 7. Under interagency agreement between the National Park Service, the BLM, and the U.S. Forest Service, the BLM generally has responsibility for conducting section 7 determinations for this river segment.

1) Establish Need

a. The specific purpose of the project is to protect or enhance the values for which the river was designated as eligible, restores the natural characteristics of the river, and/or improves the water quality of the river. The proposed project will provide additional capacity for flow regulation as outlined in Section 1.6 of the DEA/EIR. The replacement and/or modification of the four bridge features will be conducted in conjunction with other programs and projects under the direction of the Trinity River Restoration Program (TRRP). The implementation of the proposed action will incorporate measures to assure that the project is consistent with the goals established under the BLM Resource Management Plan, specifically to support management actions that will result in enhancing the fishery. The project will not diminish the scenic, recreational, or water quality values of the river.

b. Associated impacts on free-flowing characteristics of the river are minimized to the extent practicable. The proposed project would have no impact on the free-flowing characteristics of the river.

c. The Proponent and manager of the project is a Federal governmental entity. The proposed project was developed through a cooperative effort by BOR, BLM and Trinity County under the direction of the TRRP. This project will actually improve the conveyance of flows by elevating bridge decks and decreasing the total number of in-river piers.

The proposed activity is consistent with management goals and objectives for the river and is designed to maintain the ORV. The proposal is consistent with BLM objectives to enhance the Trinity River Restoration Program.

2) Define a Proposed activity

The project proponents, the project purpose and need for the project, the geographic location of the project are described in Chapter 1 of the DEA/EIR. Specific information on the duration of the proposed activities, and the magnitude/extent of the proposed activities is described in Chapter 2 of the DEA/EIR. Chapter 4 describes the relationship to past and future management activities with an emphasis on cumulative effects.

3) Describe How the Proposed Activity Will Directly Alter Within-Channel Conditions

The proposed project will have short-term and long-term impacts associated with project implementation. These impacts and relevant mitigation measures associated with in-channel conditions are described in Section 3.3 (Geology), Section 3.5 (Water Quality), and 3.6 (Fishery Resources) in the DEA/EIR. The fact that these sites have existing bridge and ancillary features that were in place at the date of designation was considered in this evaluation. Although there are short-term effects anticipated during construction, the long-term effects are expected to be limited, and to some extent positive. At the Salt Flat and Biggers Road locations, the replacement structures will reduce the number of piers in the active channel.

4) Describe How the Proposed Activity Will Directly Alter Riparian and/or Floodplain Condition

The proposed project is anticipated to replace and or modify existing crossings over the Trinity River that existed on the date of designation. Section 3.4 (Water Resources), Section 3.6 (Fishery Resources), and Section 3.7 (Vegetation, Wildlife and Wetlands) discuss the specific impacts and relevant mitigation measures relative to riparian and floodplain conditions. Although there are short-term effects anticipated during construction, the long-term effects are expected to be limited, and to some extent positive. As a component of the overall Trinity River Restoration Program, this project is expected to provide a positive benefit to the ORV's, including anadromous fish resources.

5) Describe How the Proposed Activity Will Directly Alter Upland Conditions

The proposed project is anticipated to replace and or modify existing crossings over the Trinity River that existed on the date of designation. Section 3.4 (Water Resources), Section 3.6 (Fishery Resources), Section 3.7 (Vegetation, Wildlife and Wetlands), Section 3.8 (Recreation), Section 3.11 (Cultural

Resources) and Section 3.14 (Aesthetics) discuss the specific impacts and relevant mitigation measures relative to upland conditions as they relate to the ORV's for the Trinity River.

6) Evaluate and Describe How Changes in On-Site Conditions Can/Will Alter Existing Hydrologic or Biologic Processes

As discussed in previous sections, the DEA/EIR provides a detailed description of the existing condition and environmental impacts associated with the project, including a substantial number of mitigation measures. The ability of the channel to change course, reoccupy former segments, or inundate its floodplain would not be altered by the proposed project. The following characteristics would not be impacted by the proposed project: the amount of or timing of flow in channel; existing flow patterns; surface and subsurface flow characteristics; flood storage; aggradation/degradation of the channel; or the river biological process.

7) Estimate the Magnitude and Spatial Extent of Potential Off-Site Changes

Chapter 4 of the DEA/EIR discusses the other impacts of the proposed project, including cumulative impacts that may result from incremental actions throughout the river corridor. With the exception of short-term water quality impacts (construction related turbidity) associated with the proposed project, implementation will not influence other parts of the river. It would not affect specific processes, such as water and sediment flux, and the movement and processing of nutrients.

8) Define the Time Scale Over Which Steps 3-7 are Likely to Occur

Project implementation is anticipated to occur between Fall, 2003 and Fall 2006. Specific limitations on project operations may be incorporated into the project as a result of the Biological Opinion and the Water Quality Certification.

9) Compare Project Analyses to Management Goals

Management goals relative to free-flow, water quality, riparian area and floodplain conditions would not be affected by the proposed action. It is expected that the benefits of this project will increase the likelihood of enhancing the ORV (anadromous fishery) of the Trinity River. The impacts to the visual resources of the Trinity River would be minimal with the implementation of design criteria and mitigation measures. The project would be consistent with any future actions taken by the TRRP.

10) Section 7 Determination

The proposed implementation of the proposed action described in Chapter 2 of the DEA/EIR will not affect the free-flowing condition of this segment of the Trinity River.

APPENDIX H

Delineation of Waters of the U.S., Including Wetlands and ACOE Verification Letter

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

Regulatory Branch

MAR 2 5 2003

Subject: File Number 26925N

RECEIVED
MAR 27 2003
NORTH STATE RESOURCES

Mr. Paul Uncapher, Project Manager
North State Resources, Inc.
5000 Bechelli Lane, Suite 203
Redding, California 96002

Dear Mr. Uncapher:

Thank you for your submittal of the *Trinity River Bridges Project, Delineation of Waters of the U.S. Including Wetlands*, prepared by North State Resources, Inc. for the United State Department of Interior, Bureau of Reclamation, dated February 4, 2003 (with amendment by letter dated February 11, 2003), requesting confirmation of the extent of Corps of Engineers jurisdiction at four bridges over the Trinity River (Poker Bar Bridge, Biggers Road Bridge, Salt Flat Bridge, and Bucktail Bridge), within the Weaverville and Lewiston USGS topographic quadrangle maps, in Trinity County, California.

Enclosed are four maps showing the extent and location of Corps of Engineers jurisdiction at each of the four individual bridges (Enclosures 1,2,3, and 4). We have based this jurisdictional delineation on the current conditions of the site as observed by our Eureka Field Office during a field visit dated February 10, 2003. We have adjusted the jurisdictional determination to include an additional area of wetlands within our jurisdiction at Salt Flat Bridge (immediately north Data Points DP 3 and DP 4 on Figure 3a, Enclosure 4). A change in those conditions may also change the extent of our jurisdiction. This jurisdictional delineation will expire in five years from the date of this letter. However, if there has been a change in circumstances that affects the extent of Corps jurisdiction, a revision may be done before that date.

All proposed discharges of dredged or fill material into waters of the United States must be authorized by the Corps of Engineers pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). Waters of the United States generally include tidal waters, lakes, ponds, rivers, streams (including intermittent streams), and wetlands.

Your proposed work is within our jurisdiction and a permit is required. Application for Corps authorization should be made to this office using the application form with instructions enclosed (enclosure 5). The application must include plans showing the location, extent and character of the proposed activity, prepared in accordance with the requirements contained in this pamphlet. You should note, in planning your work, that upon receipt of a properly completed application and plans, it may be necessary to advertise the proposed work by issuing a public notice for a period of 30 days.

Our nationwide or regional permits have already authorized certain activities provided specified conditions are met. Your completed application will enable us to determine whether your activity is already authorized. You are advised to refrain from commencement of your proposed activity until a determination has been made that it is covered by an existing permit. Commencement of work before you received our notification may be interpreted as a violation of our regulations.

You are advised that the Corps has established an Administrative Appeal Process, as described in 33 CFR Part 331 (65 FR 16,486; Mar. 28, 2000), and outlined in the enclosed flowchart and "Notification of Administrative Appeal Options, Process, and Request for Appeal" form (NAO-RFA)(Enclosure 6). If you do not intend to accept the approved jurisdictional determination, you may elect to provide new information to the District Engineer for reconsideration or submit a completed NAO-RFA form to the Division Engineer to initiate the appeal process. You will relinquish all rights to appeal, unless the Corps receives new information or a completed NAO-RFA form within sixty (60) days of the date of the NAO-RFA.

If you have any questions, please call David Ammerman of our Eureka Office, Regulatory Branch at telephone 707-443-0855. All correspondence should be addressed to the Eureka Office, U.S. Army Corps of Engineers, P.O. Box 4863, Eureka, California 95502, referencing file number 26925N.

Sincerely,

Jane M. Hicks

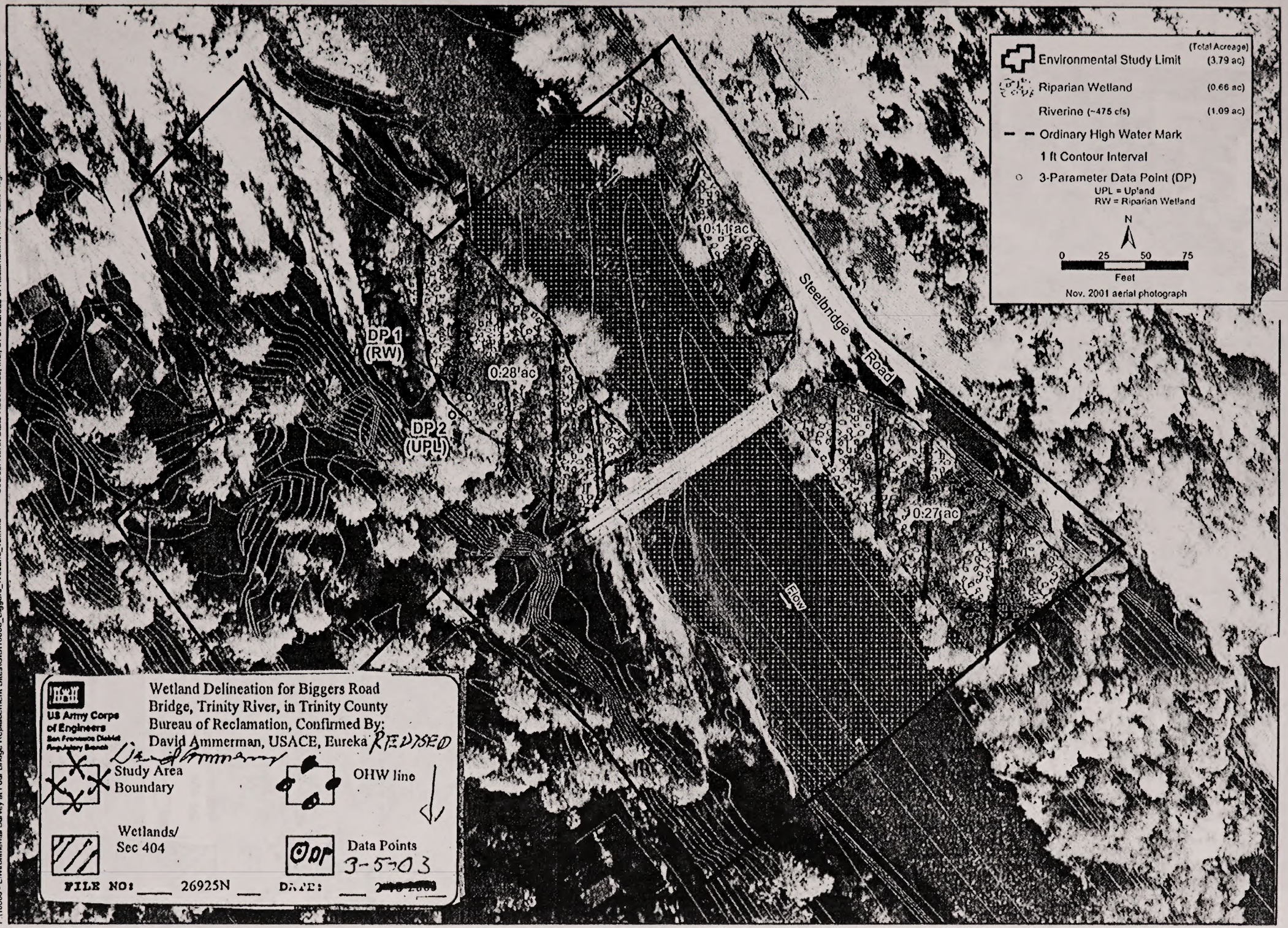
for Calvin C. Fong
Chief, Regulatory Branch

Enclosures

Copy Furnished (w/enclosures):

Messrs. Ed Solbos and Brandt Gutermuth
U.S. Department of Interior
Bureau of Reclamation
Trinity River Restoration Program
Weaverville, CA

Enclosure 1



F:\10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Biggers_Wetland_v2.mxd Source: North State Resources, Inc.; U. S. Bureau of Reclamation, Mid-Pacific Region 02-25-03 tkoehler

North State Resources, Inc.

This delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE).
NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

Figure 3.7-4d. Boundaries of Waters of the U.S. (including Wetlands)
Biggers Road Bridge, Trinity River Bridges Project
Feb. 25, 2003

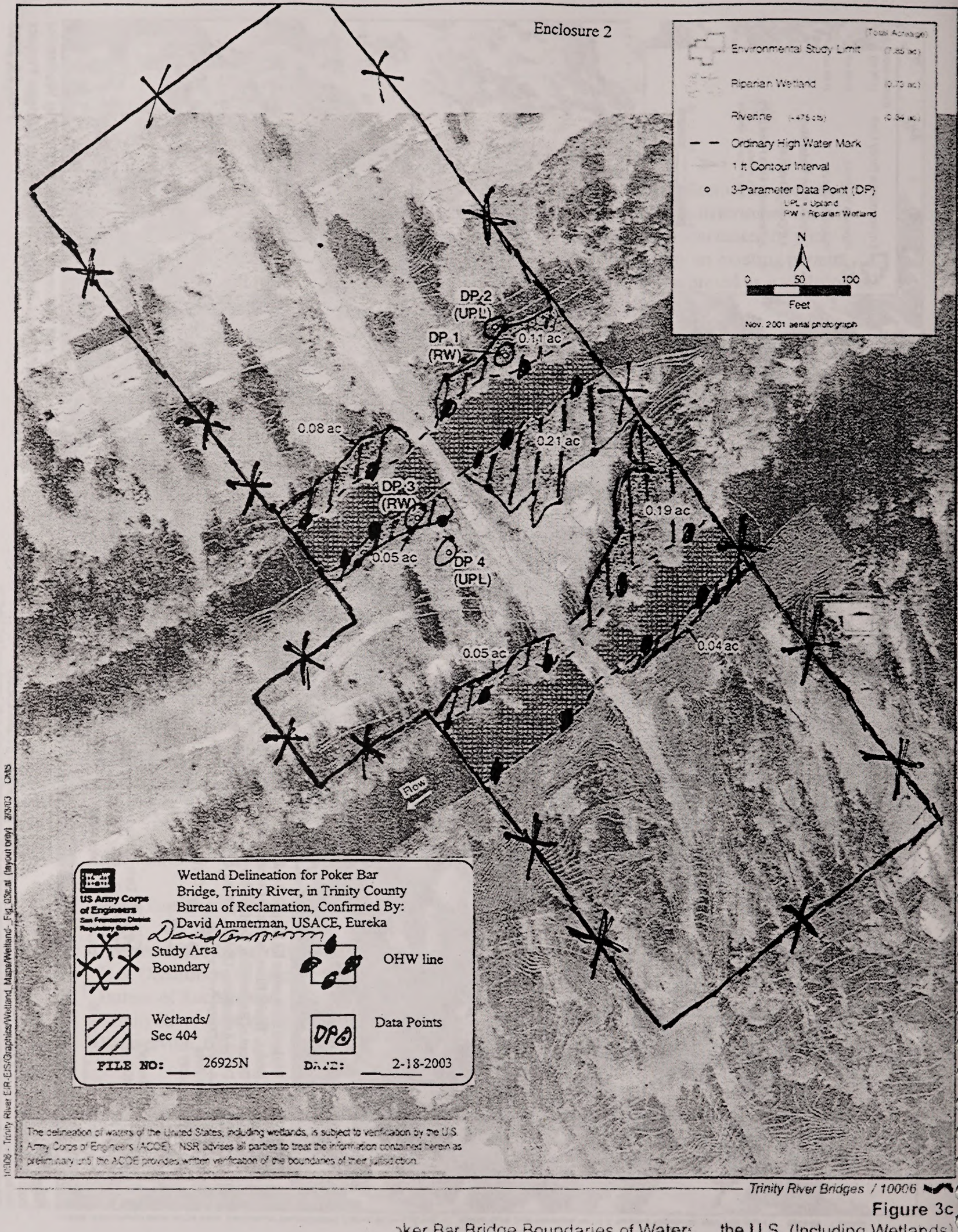

Enclosure 2
Environmental Study Limit
Riparian Wetland
Riverine
Ordinary High Water Mark
1 ft Contour Interval
3-Parameter Data Point (DP)
UPL = Upland
RW = Riparian Wetland
N
0
50
100
Feet
Nov. 2001 aerial photograph
DP 2 (UPL)
DP 1 (RW)
0.11 ac
0.08 ac
0.21 ac
DP 3 (RW)
0.19 ac
0.05 ac
DP 4 (UPL)
0.05 ac
0.04 ac
Flow
US Army Corps of Engineers
San Francisco District
Regulatory Branch
Wetland Delineation for Poker Bar Bridge, Trinity River, in Trinity County Bureau of Reclamation, Confirmed By: David Ammerman, USACE, Eureka
Study Area Boundary
OHW line
Wetlands/ Sec 404
Data Points
FILE NO: 26925N
DATE: 2-18-2003
The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE). NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

Figure 3c

oker Bar Bridge Boundaries of Waters the U.S. (Including Wetlands)

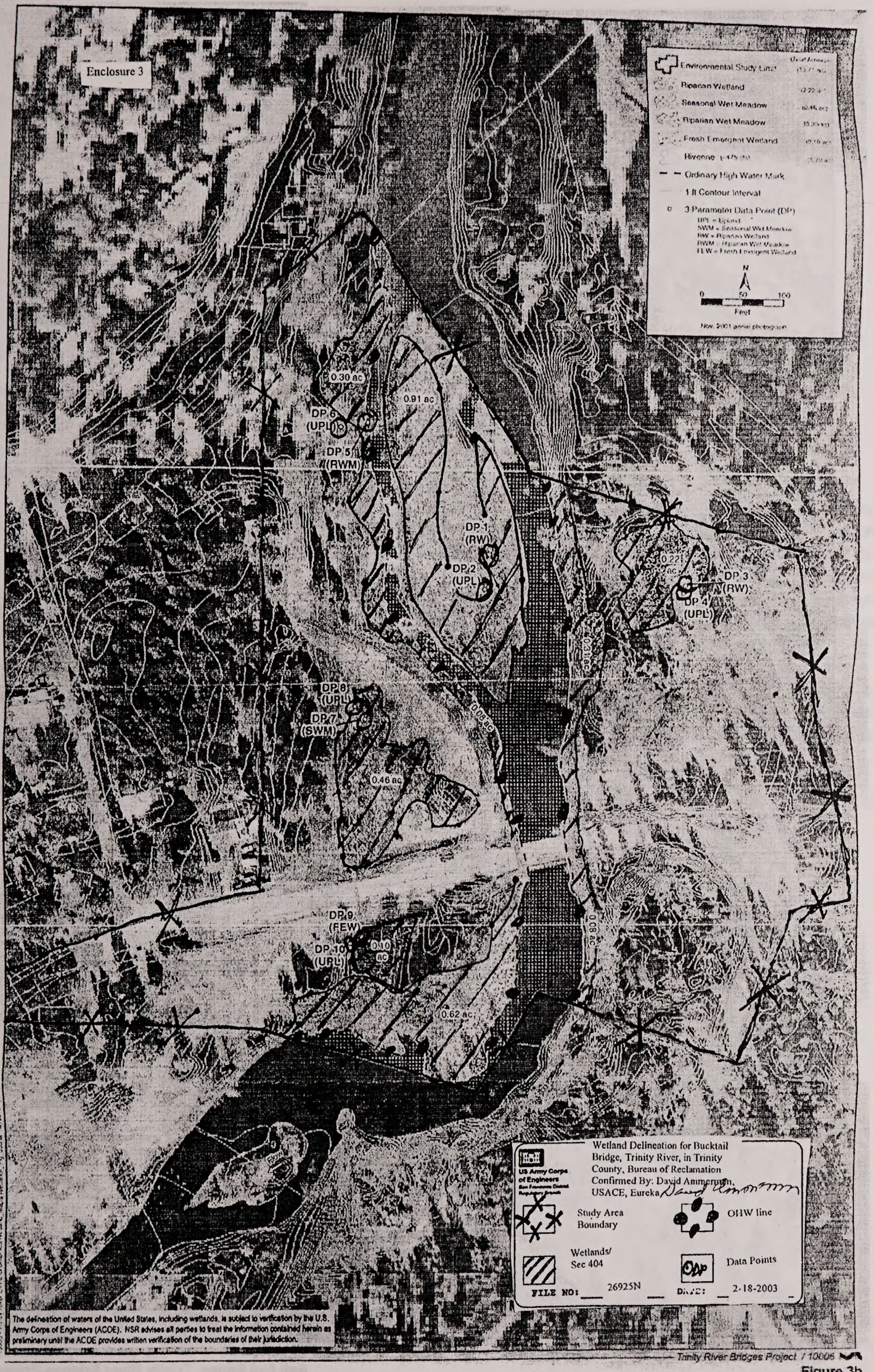
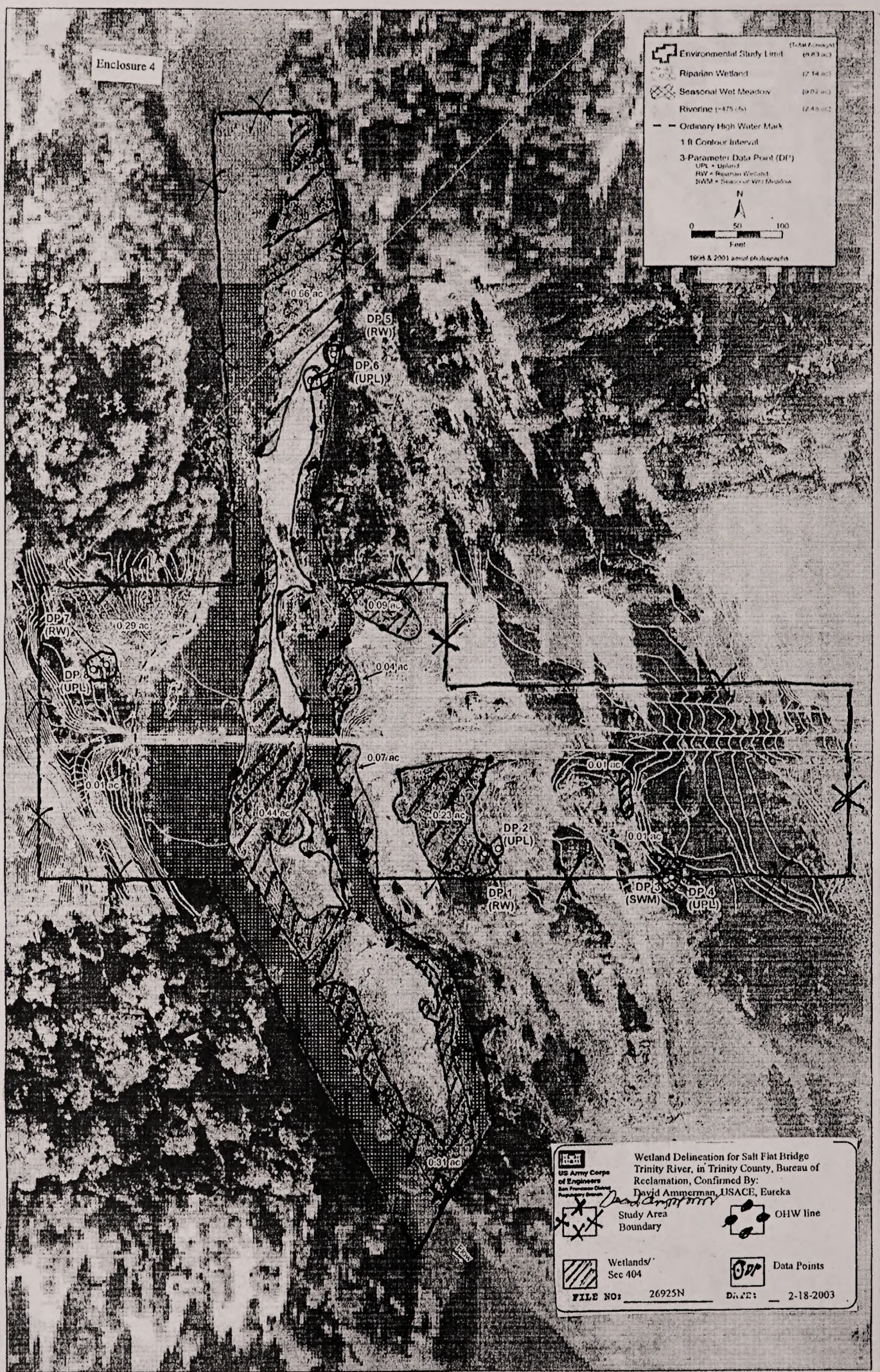


Figure 3b

Bucktail Bridge Boundaries of Waters of the U.S. (Including Wetlands)



North State Resources, Inc.

Figure 3a. Boundaries of Waters of the U.S. (including Wetlands)
Salt Flat Bridge, Trinity River Bridges Project
Feb. 10, 2003

This delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE).
NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

North State Resources, Inc.

February 11, 2003

Mr. David Ammerman
U.S. Army Corps of Engineers - Regulatory Branch
San Francisco District Office – Eureka Field Office
P.O. Box 4863
Eureka, CA 95502

SUBJECT: Request for Verification of the Delineation of Waters of the U.S. for the Trinity River Bridges Replacement Project – Salt Flat Bridge (NSR #10006).

Dear Mr. Ammerman:

Thank you for your February 10, 2003 visit to Trinity River Bridges to verify the wetland maps included in the *Trinity River Bridges Project, Delineation of Waters of the U.S. Including Wetlands* report (February 4, 2003). Based on your review of the sites, North State Resource, Inc. (NSR) has revised the Salt Flat wetland map (**Figure 3a**) and acreage table (**Table 3a**) to include the small seasonal wet meadow feature you observed. The addition of these features to the map increase the acreage of seasonal wet meadow at the Salt Flat Bridge site from 0.01 to 0.02 acres. By this letter, North State Resources requests U.S. Army Corps of Engineers written verification of the delineation for the project site.

The delineation was prepared by NSR in accordance with the methods prescribed in the *Corps of Engineers Wetlands Delineation Manual,* dated 1987, and identifies a total of 4.64 acres of jurisdictional waters occurring in the form of fresh riparian wetland, seasonal wet meadow and riverine at the Salt Flat Bridge site.

Thank you for your consideration of this matter. Please contact me at (530) 926-3595 with any questions or comments.

Sincerely,
NORTH STATE RESOURCES, Inc.

Julian Colescott
Wildlife Biologist

Enclosure: **Table 3a.** Revised Summary Table of Jurisdictional Acreage (February 11, 2003).
Figure 3a. *Boundaries of Waters of the U.S. (Including Wetlands) Salt Flat Bridge, Trinity River Bridges Project* (February 10, 2003).

c: Mr. Brandt Gutermuth (BOR)

☒ 5000 Bechelli Lane, Suite 203 Redding, California 96002 Phone (530) 222-5347 Fax (530) 222-4958
☐ 2150 River Plaza Drive, Suite 290 Sacramento, California 95833 Phone (916) 564-8541 Fax (916) 564-8544

February 11, 2003

Revised Summary Table of Jurisdictional Acreage: Tables 3a summarizes the acreages of each wetland type delineated for the Salt Flat bridge site.

TABLE 3A
ACREAGES OF WATERS OF THE U.S. – SALT FLAT

Wetland Type	Total Acreage
Total Wetlands	
Riparian Wetlands	2.14
Seasonal Wet Meadow	0.02
Total Wetlands	**2.16**
Other Waters	
Trinity River (Riverine)	2.48
Total Other Waters	2.48
Total Jurisdictional Waters	**4.64**

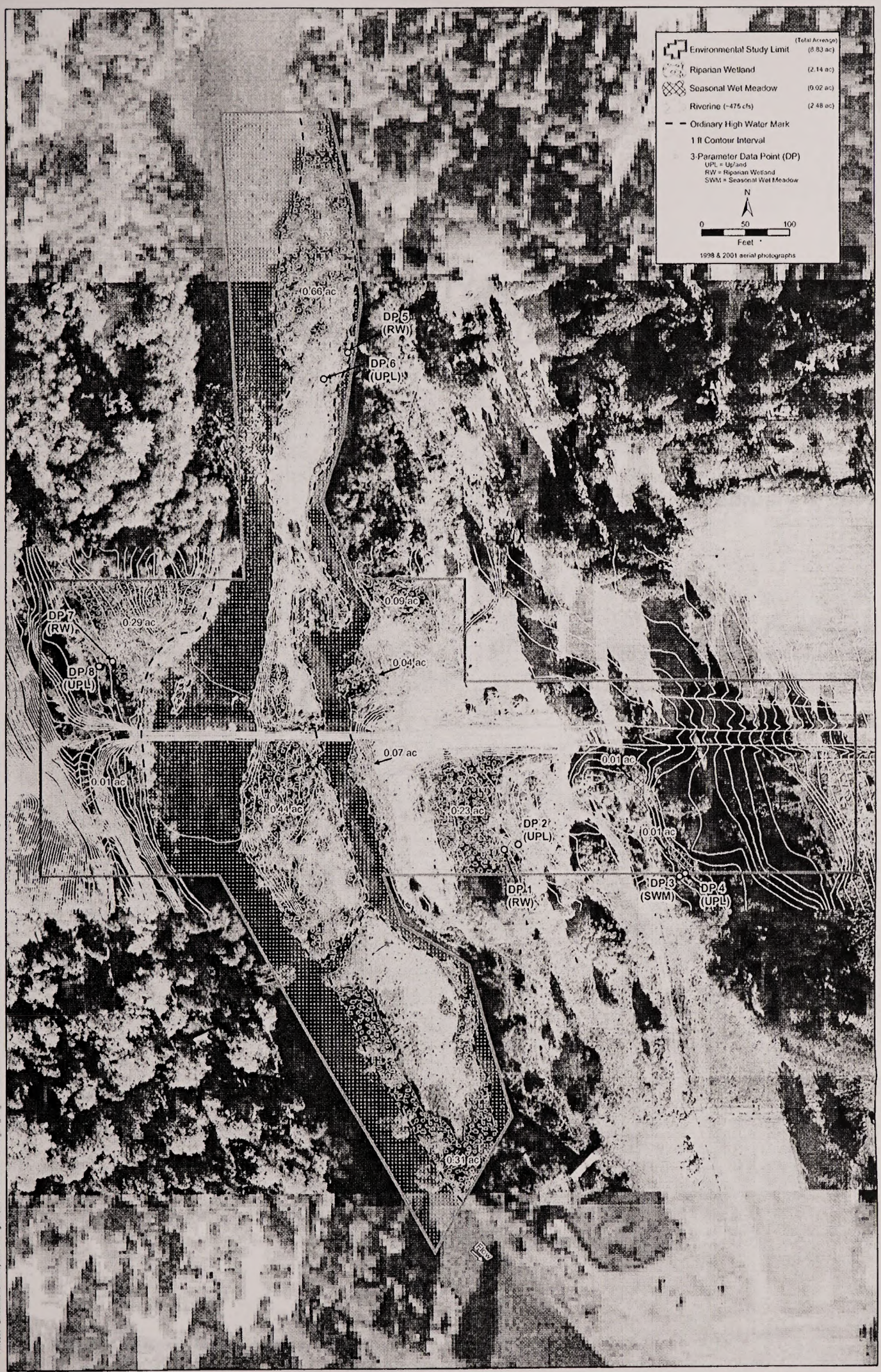


Figure 3a. Boundaries of Waters of the U.S. (including Wetlands)
Salt Flat Bridge, Trinity River Bridges Project
Feb. 10, 2003

North State Resources, Inc.

This delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE).
NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

TRINITY RIVER BRIDGES PROJECT

Delineation of Waters of the U.S. Including Wetlands

February 4, 2003

Prepared for:
United States Department of Interior
Bureau of Reclamation

Prepared by:
North State Resources, Inc.
5000 Bechelli Lane, Suite 203
Redding, CA 96002
(530) 222-5347
(530) 222-4958 *fax*

10006

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TRINITY RIVER BRIDGES PROJECT

Delineation of Waters of the U.S. Including Wetlands

1. SUMMARY

The United States Department of the Interior, Bureau of Reclamation is proposing to replace four bridges along the Trinity River in Trinity County, California. A wetland delineation, which follows the U.S. Army Corps of Engineers methodology (Environmental Laboratory 1987), was conducted at each of the four sites. Waters of the U.S., including wetlands observed on the sites consist of riparian wetlands totaling 5.74 acres, seasonal wet meadows totaling 0.47 acres, a riparian wet meadow totaling 0.3 acres, and a fresh emergent wetland totaling 0.1 acres. "Other waters" in the study area, which include the Trinity River, total 6.11 acres of riverine habitat. Acreages for each site, broken down by wetland type, are presented in **Section 6c**, Discussion of Results.

This delineation of waters of the United States, including wetlands (as depicted on **Figures 3a-3d**), is subject to verification by the U.S. Army Corps of Engineers. North State Resources, Inc. (NSR) advises all parties to treat the informatio n contained herein as preliminary until the U.S. Army Corps of Engineers provides written verification of the boundaries of their jurisdiction.

2. STUDY AREA LOCATION

a) **Project Location:** The proposed project sites are located along the 10 miles of Trinity River mainstem between the Salt Flat bridge near the community of Lewiston and the Biggers Road Bridge upstream of Douglas City, Trinity County, California. Each bridge site will be referred to by specific name, while collectively the four sites shall be referred to as the study area. The Bureau of Reclamation has defined the Environmental Study Limits (ESL) for each of the four sites (**Figures 3a-3d**).

Salt Flat Bridge

The Salt Flat bridge is the most upstream bridge replacement site within the study area. It is located on Salt Flat Road at River Mile 107, about 2.5 miles west of Lewiston, California. It is found within the *Lewiston*, California 7.5-minute US Geological Survey (USGS) quadrangle map, Township 33 North, Range 9 West, Section 13, Mount Diablo Baseline Meridian (MDBM) 040° 42' 47" North latitude by 122° 50' 06" West longitude. A general vicinity map is presented in **Figure 1**, with the project location on a USGS 7.5-minute topographic map shown in **Figure 2**.

Bucktail Bridge

The Bucktail bridge site is located on Browns Mountain Road at River Mile 105, about five miles west of Lewiston, California. It is found within the *Lewiston*, California 7.5-minute USGS quadrangle map, Township 33 North, Range 9 West, Section 23, MDBM, 040° 42' 16" North latitude by 122° 50' 43" West longitude. A general

vicinity map is presented in **Figure 1**, with the project location on a USGS 7.5-minute topographic map shown in **Figure 2**.

Poker Bar Bridge

The Poker Bar bridge site is located on Bridge Road at River Mile 102, halfway between the towns of Lewiston and Douglas City, California. It is found within the *Weaverville*, California 7.5-minute USGS quadrangle map, Township 33 North, Range 9 West, Sections 33 and 34, MDBM, 040° 40' 49" North latitude by 122° 52' 52" West longitude. A general vicinity map is presented in **Figure 1**, with the project location on a USGS 7.5-minute topographic map shown in **Figure 2**.

Biggers Road Bridge

The most downstream bridge replacement site is the Biggers Road Bridge site. The bridge is located adjacent to Steel Bridge Road, about three miles upstream (east) of Douglas City, near River Mile 97. It is found within the *Weaverville*, California 7.5-minute USGS quadrangle map, Township 33 North, Range 9 West, Section 32, MDBM, 040° 40' 03" North latitude by 122° 54' 19" West longitude. A general vicinity map is presented in **Figure 1**, with the project location on a USGS 7.5-minute topographic map shown in **Figure 2.**

b) **Acreage:** The project study area encompasses approximately 33.74 acres. The study area acreage for each bridge site is provided below:

Salt Flat: 8.83 acres

Bucktail: 13.71 acres

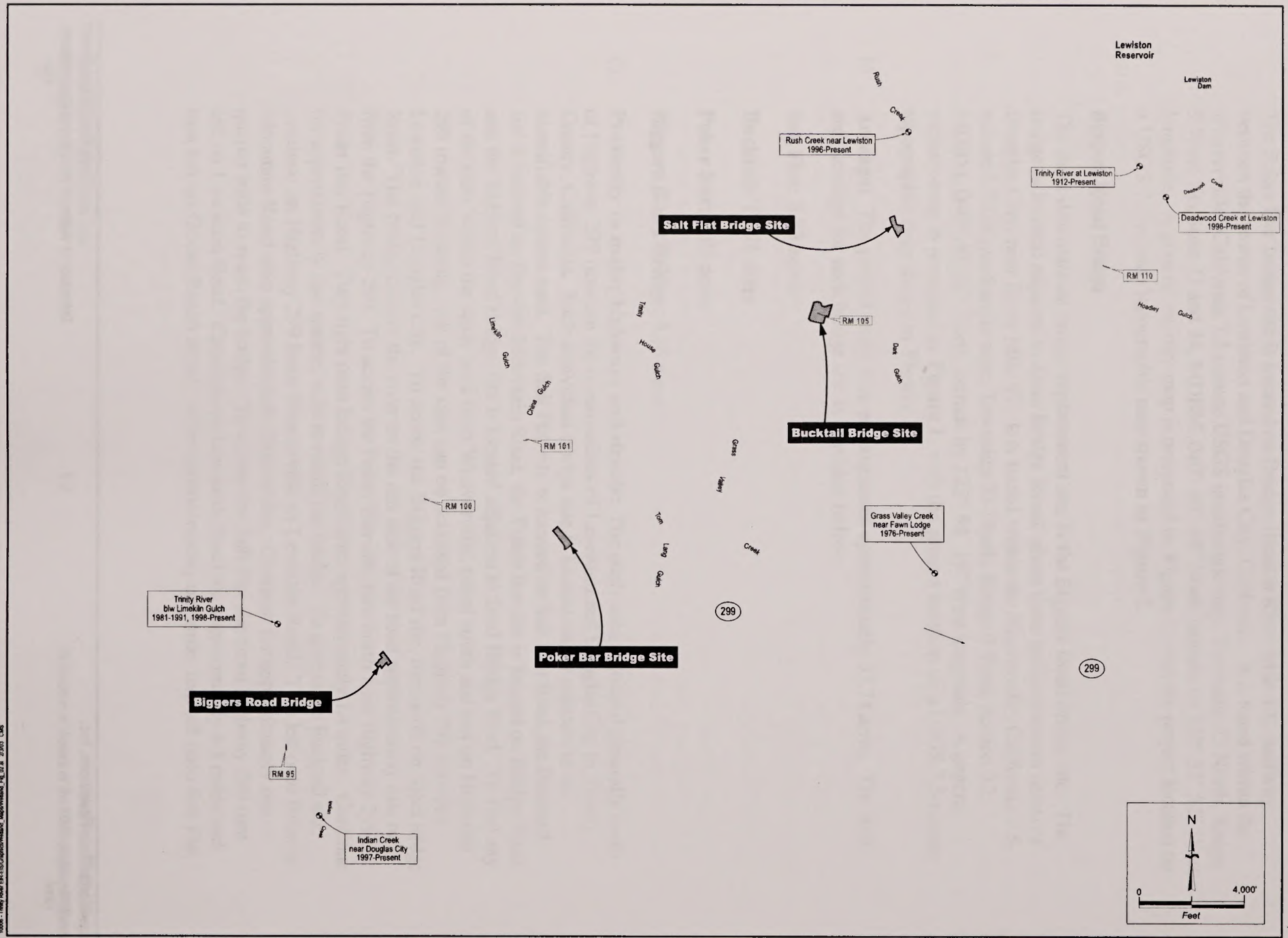
Poker Bar: 7.85 acres

Biggers Road Bridge: 3.35 acres

c) **Proximity to major highways and streets:** The study area is located generally north of Highway 299 between the communities of Lewiston and Douglas City in Trinity County, California. Each individual bridge site is located on, or adjacent to an identifiable access road. The Salt Flat site is located on Salt Flat Road, the Bucktail site is located on Browns Mountain Road, the Poker Bar site is located on Bridge Road, and the Biggers Road Bridge site is located adjacent to Steel Bridge Road. To find any of the sites within the study area from Weaverville, travel south and east on Highway 299 toward Redding. All of the sites can be accessed from Highway 299 between Lewiston and Douglas City. To access the Biggers Road site, turn north on Steel Ridge Road. The bridge crosses the river on the left side of the road approximately one mile from the Highway 299. To access the Poker Bar site, turn north from Highway 299 on Poker Bar Road. Turn right onto Bridge Road after approximately 1.4 miles. Continue for approximately one-quarter mile to reach the bridge. To access the Bucktail site, continue on Highway 299 from Weaverville to Lewiston Road. Turn left onto Browns Mountain Road after approximately three miles. Continue for approximately one-quarter mile to reach the bridge. To access the Salt Flat site from Highway 299 turn left on Lewiston Road. Continue on Lewiston Road for approximately 4.3 miles and turn left on Goose Ranch Road. After approximately one mile, turn left onto Salt Flat

Insert

Figure 1 Project Vicinity Map



Source: U.S. Geological Survey, 7.5-Minute Quedrangles
Lewiston, CA (40122f7); Weaverville, CA (40122f8)

10006 - Trinity River EIR-EIS\Graphics\Wetland_Maps\Wetland_Fig_02.ai 2/3/03 CMS

Figure 2
Project Location

Road. The bridge is approximately one-quarter mile from the corner of Salt Flat Road and Goose Ranch Road.

d) **USGS Hydrologic Unit:** The project study area is located within USGS Hydrologic Map Unit Number 18010211.

3. ENVIRONMENTAL SETTING

a) **Current/Recent Land Use:**

The Trinity River Basin encompasses the majority of Trinity County and the easternmost portion of Humboldt County. The terrain is predominantly mountainous and forested, with little available farming area. Two scenic byways cross the county: Highway 299 and State Route 3. Lakes and rivers provide opportunities for fishing and boating. Most of the Hoopa Valley Indian Reservation is within the basin. The largest town in the region is Weaverville, followed by Hoopa, Hayfork, and Lewiston. Land use within the Trinity River Basin is greatly influenced by the large amount of public, Indian, and private forest lands, much of which is used for timber production and other natural resource related uses. Private uses along the Trinity River are generally limited to scattered residential and commercial development. State Highway 299 is the primary travel corridor through Trinity County, connecting the Central Valley with the coastal communities of Humboldt County.

The Trinity River Basin is sparsely populated. Trinity County had a population of 13,022 in 2000. Throughout the watershed, residential, commercial, and industrial uses tend to be concentrated on relatively flat areas near the Trinity River or its tributaries, as typified by the population centers of Weaverville, Hayfork, Lewiston, Willow Creek, and Hoopa. Together, these communities house two-thirds of the basin's 15,000 people.

Currently, all four of the sites within the study area support bridges used for crossing the Trinity River by vehicle. All of the sites contain parcels of land that are privately owned. Rural residential development is associated with each study area. Salt Flat and Bucktail sites include lands managed by Trinity County and the Bureau of Land Management.

The Salt Flat site is incorporated into the Lewiston Community Plan area. At Salt Flat, residential areas are located on either side of Goose Ranch Road and on both sides of the Trinity River. The residents north of the Trinity River rely on the Salt Flat Bridge to access their property. This bridge also provides access to commercial timber property and lands managed by Bureau of Land Management (BLM).

The Bucktail residential area is located on the north side of the Trinity River and is accessed by Browns Mountain Road and the Bucktail Bridge. Browns Mountain Road and the Bucktail Bridge are managed by Trinity County. The Lewiston Community Plan identifies the Bucktail site as a major public river access point. Designated parking is available northeast and southeast of the bridge, public access points are located northeast and southwest of the bridge, and sanitary facilities are available southwest of the bridge.

The Poker Bar subdivision is located midway between Lewiston and Douglas City, on either side of the Poker Bar Bridge. Poker Bar Road, north of Highway 299, serves this residential area. This residential area is incorporated into the Douglas City Community Plan. Immediately south of the Poker Bar Bridge, the Douglas City Rural Fire District maintains a volunteer fire station. This station provides service to residents on both sides of the Trinity River.

The Biggers Road Bridge provides access for several residential properties across the river from Steel Bridge Road. Trinity County maintains Steel Bridge Road as a primary access route into this area. Access is provided for residential and recreational uses adjacent to the Trinity River.

b) **Site Elevation:** The approximate average elevation within the project study area at the base of each bridge site is as follows:

Salt Flat: 1,773 feet above mean sea level

Bucktail: 1,751 feet above mean sea level

Poker Bar: 1,721 feet above mean sea level

Biggers Road: 1,659 feet above mean sea level

Note: These elevations are approximate based on hydraulic modeling data provided by the Bureau of Reclamation.

c) **Climate:**

- ***Type:*** Mediterranean with moderate winters and hot, dry summers.
- ***Precipitation:*** Approximately 38 inches annually, most of which falls between October 1 and April 30.
- ***Air temperature:*** The average annual air temperature is approximately 53 degrees Fahrenheit. The average January high temperature is 46.7° F and average July high temperature is 93.4° F.
- ***Growing season:*** Approximately 130 days, assume May 24 to September 26.

d) **Site Topography/Landscape:** Each of the bridge sites has similar landscape and topographical features. The sites are generally flat adjacent to the river with relatively steep fill slopes leading from the road to the main body of the site. In each case, the fill prism supporting the bridge structure on the banks of the river was steep. There are areas of steep hillside adjacent to the river, or within the study limits at each project site.

e) **Hydrology/Hydrologic Features:** The hydrology of each of the sites is influenced almost exclusively by the main stem of the Trinity River and associated operation of the Trinity River Division of the Central Valley Project (Lewiston Dam and Trinity Dam). Portions of each site, however, are influenced by runoff from the adjacent roads and hillsides as well as precipitation events. Rush Creek is a principal tributary that contributes sediment and flow to the Trinity River, immediately upstream of the Salt Flat site. Grass Valley Creek is an important tributary that provides significant

amounts of fine sediment, and flow. It enters the Trinity River approximately ½mile downstream of the Bucktail site.

f) **Soils:** The soils on the study area are described in the *Soil Survey of Trinity County, California, Weaverville Area* (US Department of Agriculture, 1998). A figure showing the soil map units within the study area is presented after the datasheets in **Appendix A**. Two soil map units were identified within the project study area:

- *102* – Atter Dumps, dredge tailings-Xerofluvents complex, 2-9 percent slopes. This soil map unit has a hydric component and hydric inclusions. The hydric landforms within this map unit are the floodplain channel, fluvial terrace and low floodplain. The subgroup taxonomy for the Atter series is *Typic Xerorthents.* Atter series soils are somewhat excessively drained.
- *217* – Xerofluvents-Riverwash complex, 0-5 percent slopes. This soil map unit has a hydric component and hydric inclusions. The subgroup taxonomy for the Xerofluvents series is *Typic Xerofluvents.* The Xerofluvents series soils are well drained soils.

g) **Plant Communities:** The project study area supports six plant communities: Montane hardwood conifer, fresh emergent wetland, montane riparian, seasonal wet meadow, riparian wet meadow, and riverine. Since Mayer and Laudenslayer (1988) do not describe seasonal and riparian wet meadows specifically, they will be described as subsets of the montane riparian habitat. Each site within the study area supports many of the same plant communities. The plant indicator status categories for species occurring in the study area are defined in **Table 1**. A description of each community type is provided below.

Montane Hardwood Conifer: In the northern interior of California, montane hardwood conifer habitat as described by Mayer and Laudenslayer, 1988 is generally dominated by California black oak, bigleaf maple, Pacific madrone, ponderosa pine, white fir, sugar pine and Douglas fir. Within the study area, the habitat is dominated by ponderosa pine (*Pinus ponderosa - UPL)*, Douglas fir (*Pseudotsuga menziesii* var. *menziesii - UPL)*, canyon live oak (*Quercus chrysolepsis - UPL)*, interior live oak (*Quercus wislizenii - UPL)*, and black oak (*Quercus kelloggii - UPL).* The underlying herbaceous layer is dominated by annual grasses and shrubs including wild oat (*Avena fatua - UPL)*, silver European hairgrass (*Aira caryophyllea - UPL)*, yellow star thistle (*Centaurea solstitialis - UPL)*, black mustard (*Brassica nigra - UPL)*, ripgut brome (*Bromus diandrus - NI)*, softchess *(Bromus hordeaceus – FACU-)*, cheatgrass (*Bromus tectorum - UPL)*, California wild grape (*Vitis californica - FACW)*, poison oak (*Toxicodendron diversilobum - UPL)*, and Himilayan blackberry (*Rubus discolor – FACW*).* This plant community type is prevalent at each of the four bridge sites.

Fresh Emergent Wetland: Fresh emergent wetland plant community occurs within the Bucktail bridge replacement site and is characterized by erect or floating, rooted, herbaceous hydrophytes. Dominant species within the study area include narrow-leafed cattail (*Typha angustifolia - OBL*) and small-fruited bulrush (*scirpus microcarpus - OBL*) within the emergent wetland surrounded by, narrow-leafed willow (*Salix exigua - OBL*), red willow (*Salix laevigata - UPL*), Himilayan blackberry, and white alder (*Alnus rhombifolia - FACW*). This plant community type was not observed at the Salt Flat, Poker Bar, and Biggers Road sites.

Montane Riparian: Montane riparian habitat occurs adjacent to the normal high water mark of the Trinity River at all four of the bridge sites. Within the study area, this habitat type is dominated by black cottonwood (*Populus balsamifera* ssp. *trichocarpa* - *FACW*), narrow-leafed willow, arroyo willow (*Salix lasiolepsis* - *FACW*), red willow, shining willow (*Salix lucida* - *NI*), white alder (*Alnus rhombifolia* – FACW), Oregon ash (*Fraxinus latifolia* - *FACW*), Himilayan blackberry, velvet grass (*Holcus lanatus* - *FAC*), California rose (*Rosa californica* – *FAC+*), California wild grape, smooth scouring rush (*Equisetum laevigatum* – FACW) and mugwort (*Artemesia douglasiana* - *FACW*).

Seasonal Wet Meadow: – Seasonal wet meadow habitat is found within two of the bridge sites, Bucktail and Salt Flat. This habitat type occurs in areas where water does not appear to pond but saturates to the surface for sufficient duration to create a wetland habitat. In addition, this habitat type is likely affected by hydrologic factors other than the Trinity River. Within the study area this habitat type is dominated by Himalayan blackberry, curly dock, bur sedge (*Cyperus odoratus* - FACW), cockle bur (*Xanthium strumarium* - FAC+), Italian and perennial ryegrass (*Lolium multiflorum* - FAC and *Lolium perennae* - FAC) and rabbitfoot polypogon (*Polypogon monspeliensis* - FACW+).

Riparian Wet Meadow: - Riparian wet meadow habitat is found only at the Bucktail bridge site. This habitat occurs adjacent to the Trinity River and is influenced by its hydrology, however it does not display the same vegetation as the montane riparian community. The dominant species include small-fruited bulrush (*Scirpus microcarpus* – OBL), tufted hairgrass (*Deschampsia cespitosa* – FACW), velvet grass, smooth scouring rush, and white alder.

Riverine: Riverine (other waters) habitat within the project study area is limited to the open water channel of the mainstem of the Trinity River, which is a perennial waterway. Within the project study area, the Trinity River channel varies in width between sites but averages approximately 50 to 60 feet wide. It is dominated by run and riffle habitats, with boulder, cobble, gravel, and sand substrates. Vegetation within the active river is sparse with occasional clumps of sedges. Montane riparian habitat transitions into riverine habitat along the flood plain.

TABLE 1
PLANT INDICATOR STATUS CATEGORIES AND DEFINITIONS

Indicator Category	Indicator Symbol	Definition
Obligate Wetland Plants	OBL	Plants that occur almost always (estimated probability >99 percent) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1 percent) in non-wetlands.
Facultative Wetland Plants	FACW	Plants that occur usually (estimated probability >67 percent to 99 percent) in wetlands, but also occur (estimated probability 1 percent to 33 percent) in non-wetlands.
Facultative Plants	FAC	Plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and non-wetlands.
Facultative Upland Plants	FACU	Plants that occur sometimes (estimated probability 1 percent to <33 percent) in wetlands, but occur more often (estimated probability >67 percent to 99 percent) in non-wetlands.

TABLE 1
PLANT INDICATOR STATUS CATEGORIES AND DEFINITIONS

Indicator Category	Indicator Symbol	Definition
Obligate Upland Plants	UPL	Plants that occur rarely (estimated probability <1 percent) in wetlands, but occur almost always (estimated probability >99 percent) in non-wetlands under natural conditions.
No Indicator	NI	Plants for which insufficient information was available to determine an indicator status.
A positive (+) or negative (-) sign was used with the Facultative Indicator categories (FACW, FAC, FACU) to more specifically define the regional frequency of occurrence in wetlands. A positive sign indicates plant species to be more frequently found in wetlands and a negative sign indicates plant species to be less frequently found in wetlands, within the estimated probability assigned to each indicator category.		

4. DELINEATION METHODS AND REFERENCES

a) **Overall Technical Method:** The routine on-site determination was based on field observations of soil, vegetation, and hydrologic characteristics as defined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Twenty-four (24) three-parameter data points were characterized and documented for all four sites. Data forms are presented in **Appendix A.**

b) **Date of Field Observations:** The field observations for this wetland delineation were conducted on July 16-18 and, and July 23-24, 2002.

c) **Wetland Vegetation Indicator Status Reference:** *National List of Plant Species That Occur in Wetlands: California (Region 0)*, (Reed 1988).

d) **Hydric Soil Method of Determination Followed:** Indicators of hydric soils were observed in the field in accordance with the conventions of the *National Cooperative Soil Survey and Soil Taxonomy* (Soil Survey Staff 1992) and the Trinity County hydric soils list (US Department of Agriculture, 1992).

e) **Wetland Hydrology Method of Determination Followed:** Indicators of depth and duration of soil saturation, ponding, flooding, drainage patterns, and the ordinary high water mark were observed in the field.

f) **Wetland Mapping:** The boundaries of each wetland feature, the three-parameter data points, and several location monuments were mapped using a Pathfinder Pro Global Positioning System (GPS) capable of sub-meter accuracy (NAD 27 projection). These data points were then overlaid onto digital aerial photographs of the sites, and aligned using the monument location data.

5. ATYPICAL SITUATIONS

No atypical situations exist within the study area at any of the four bridge replacement sites.

6. DELINEATION RESULTS

a) **Boundaries of Waters of the U.S.: Figures 3a-3d** illustrate the boundaries of waters of the U.S. including wetlands delineated within the project study area. The ordinary high water mark of the Trinity River is also identified for each of the four sites.

b) **Characteristics of Jurisdictional Waters Observed: Tables 2a-2d** summarizes the characteristics of each wetland type observed within the project study area. The Riverine wetland type exists at each site in association with the Trinity River.

TABLE 2A
CHARACTERISTICS OF THE WETLAND TYPES ON THE SALT FLAT BRIDGE REPLACEMENT SITE

Jurisdictional Waters Type	Wetland Vegetation Indicators Typical Dominant Wetland Plant Species			Hydric Soils Indicators	Hydrology Indicators
	Common Name	Scientific Name	Indicator Status		
Riparian Wetland (Montane Riparian)	Narrow -leafed willow	*Salix exigua*	OBL	Gleyed or low chroma colors, frequent flooding, listed on local hydric soils list.	Saturated in upper 12 inches, drift lines, water stained leaves, FAC-Neutral test.
	Arroyo willow	*Salix lasiolepis*	FACW		
	White alder	*Alnus rhombifolia*	FACW		
	Oregon ash	*Fraxinus latifolia*	FACW		
	Black cottonwood	*Populus balsamifera* ssp. *trichocarpa*	FACW		
	Himalayan blackberry	*Rubus discolor*	FACW*		
	Common rush	*Juncus effusus*	OBL		
	Spike rush	*Eleocharis macrostachya*	OBL		
	Common velvet grass	*Holcus lanatus*	FAC		
	Nutsedge	*Cyperus odoratus*	OBL		
Seasonal Wet Meadow	Santa Barbara sedge	*Carex barbarae*	FACW	Gleyed or low chroma colors, listed on local hydric soils list.	Water stained leaves, FAC-Neutral test.
	Poison hemlock	*Conium maculatum*	FACW		
	Note: These species represent 90% of the vegetation in this feature.				

TABLE 2 B
CHARACTERISTICS OF THE WETLAND TYPES ON THE BUCKTAIL BRIDGE REPLACEMENT SITE

Jurisdictional Waters Type	Wetland Vegetation Indicators Typical Dominant Wetland Plant Species			Hydric Soils Indicators	Hydrology Indicators
	Common Name	Scientific Name	Indicator Status		
Riparian Wetland (Montane Riparian)	Narrow-leafed willow	*Salix exigua*	OBL	Gleyed or low chroma colors, frequent flooding, listed on local hydric soils list.	Saturated in upper 12 inches, drift lines, FAC-Neutral test.
	California wild grape	*Vitis californica*	FACW		
	Himalayan blackberry	*Rubus discolor*	FACW*		
	Smooth scouring rush	*Equisetum laevigatum*	FACW		
	Broad-leafed cattail	*Typha latifolia*	OBL		
	Common velvet grass	*Holcus lanatus*	FAC		
Fresh Emergent Wetland	Narrow-leafed cattail	*Typha angustifolia*	OBL	Sulfidic odor, gleyed or low chroma colors, listed on local hydric soils list, frequent flooding.	Inundated, saturated in upper 12 inches, drift lines, oxidized root channels in upper 12 inches, FAC-Neutral test.
	Small-fruited bulrush	*Scirpus microcarpus*	OBL		
	Himalayan blackberry	*Rubus discolor*	FACW*		
	Narrow -leafed willow	*Salix exigua*	OBL		
	White alder	*Alnus rhombifolia*	FAC		
Seasonal Wet Meadow	Narrow-leafed willow	*Salix exigua*	OBL	Gleyed or low chroma colors, listed on local hydric soils list, frequent flooding.	Saturated in upper 12 inches, drift lines, FAC-Neutral test.
	Himalayan blackberry	*Rubus discolor*	FACW*		
	Tufted hairgrass	*Deschampsia cespitosa*	FACW		
	Common velvet grass	*Holcus lanatus*	FAC		
	Smooth scouring rush	*Equisetum laevigatum*	FAC		
Riparian Wet Meadow	Small-fruited bulrush	*Scirpus microcarpus*	OBL	Gleyed or low chroma colors, listed on local hydric soils list, frequent flooding.	Saturated in upper 12 inches, drift lines, FAC-Neutral test.
	Smooth scouring rush	*Equisetum laevigatum*	FAC		
	Common velvet grass	*Holcus lanatus*	FAC		
	Tufted hairgrass	*Deschampsia cespitosa*	FACW		
	White alder	*Alnus rhombifolia*	FACW		

TABLE 2 C
CHARACTERISTICS OF THE WETLAND TYPES ON THE POKER BAR BRIDGE REPLACEMENT SITE

Jurisdictional Waters Type	Wetland Vegetation Indicators Typical Dominant Wetland Plant Species			Hydric Soils Indicators	Hydrology Indicators
	Common Name	Scientific Name	Indicator Status		
Riparian Wetland (Montane Riparian)	Narrow-leafed willow	*Salix exigua*	OBL	Gleyed or low chroma colors, listed on local hydric soils list, frequent flooding.	Saturated in upper 12 inches, drift lines, water-stained leaves, FAC-Neutral test.
	Arroyo willow	*Salix lasiolepsis*	FACW		
	White alder	*Alnus rhombifolia*	FACW		
	Himalayan blackberry	*Rubus discolor*	FACW*		
	Common rush	*Juncus effusus*	OBL		
	Mugwort	*Artemesia douglasiana*	FACW		
	Common velvet grass	*Holcus lanatus*	FAC		
	Small-fruited bulrush	*Scirpus microcarpus*	OBL		
	Smooth scouring rush	*Equisetum laevigatum*	FAC		

TABLE 2 D
CHARACTERISTICS OF THE WETLAND TYPES ON THE BIGGERS ROAD BRIDGE REPLACEMENT SITE

Jurisdictional Waters Type	Wetland Vegetation Indicators Typical Dominant Wetland Plant Species			Hydric Soils Indicators	Hydrology Indicators
	Common Name	Scientific Name	Indicator Status		
Riparian Wetland (Montane Riparian)	Narrow-leafed willow	*Salix exigua*	OBL	Gleyed or low chroma colors, listed on hydric soils list, frequent flooding.	Drift lines, FAC-neutral test.
	Arroyo willow	*Salix lasiolepis*	FACW		
	White alder	*Alnus rhombifolia*	FACW		
	Himalayan blackberry	*Rubus discolor*	FACW*		
	California wild grape	*Vitis californica*	FACW		
	Torrent sedge	*Carex nudata*	FACW		
	Common velvet grass	*Holcus lanatus*	FAC		

c) **Discussion of Results:** The wetland resources occurring within the Trinity Bridges Project study area include riverine habitat associated with the Trinity River, riparian wetlands (montane riparian) adjacent to the river, an area of fresh emergent wetland at Bucktail, a riparian wet meadow at Bucktail, and a seasonal wet meadow at Salt Flat and Bucktail.

The Trinity River Division (TRD) of the Central Valley Project (CVP) primarily influences the regional hydrology. The TRD consists of a series of dams, tunnels, and powerplants that export water from the Trinity River Basin into the Sacramento River Basin. Trinity and Lewiston Dams currently regulate Trinity River flows below River Mile (RM) 112. With a capacity of 2.4 million acre feet (maf), Trinity Reservoir is the largest component of the TRD. Releases from Trinity Reservoir are re-regulated in Lewiston Reservoir prior to release downstream into the Trinity River. Lewiston Reservoir also acts as a forebay for the trans-basin export of water into Whiskeytown Reservoir via the Clear Creek Tunnel. Lewiston Dam marks the upstream limit of anadromous salmonid access.

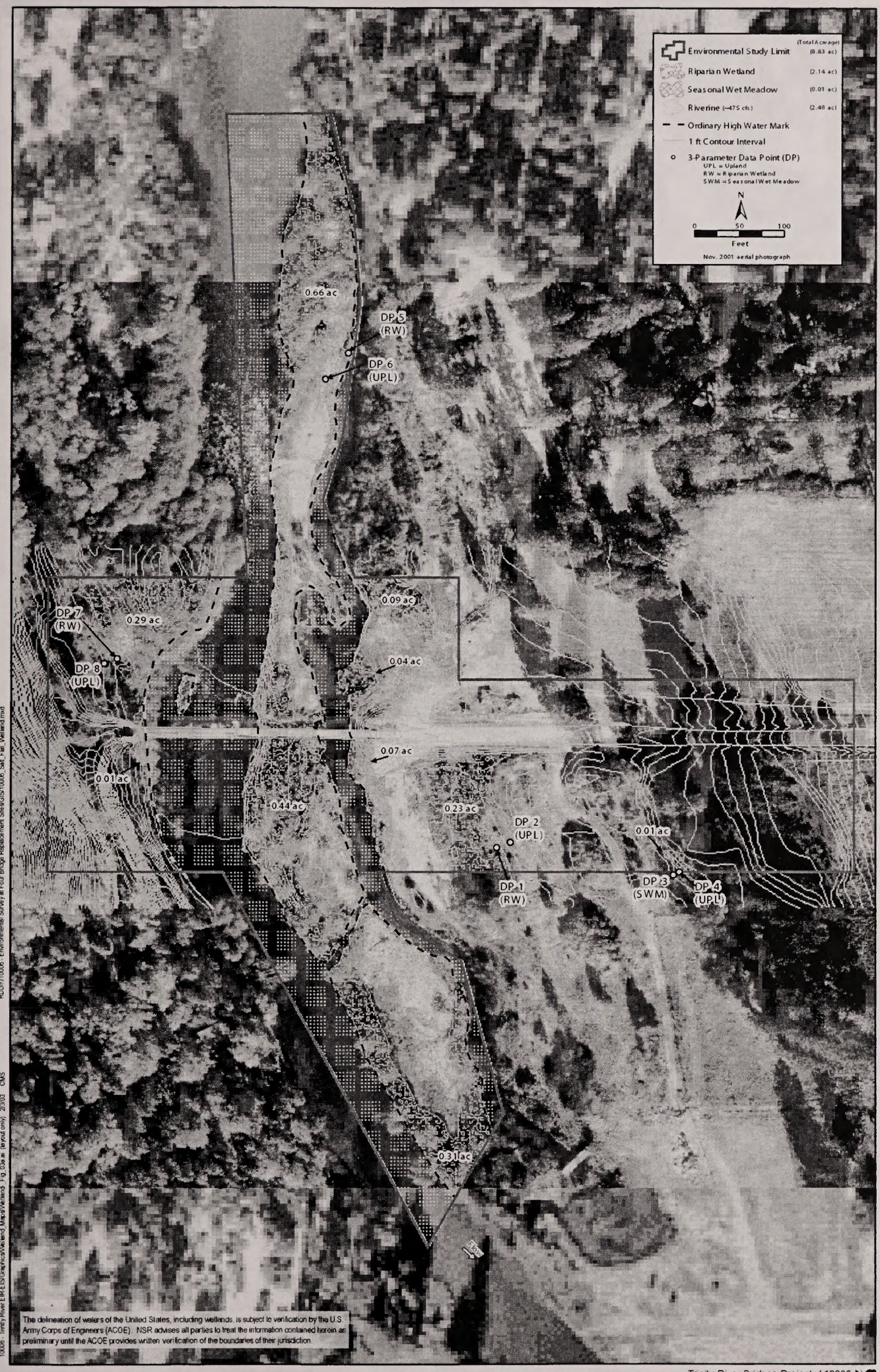
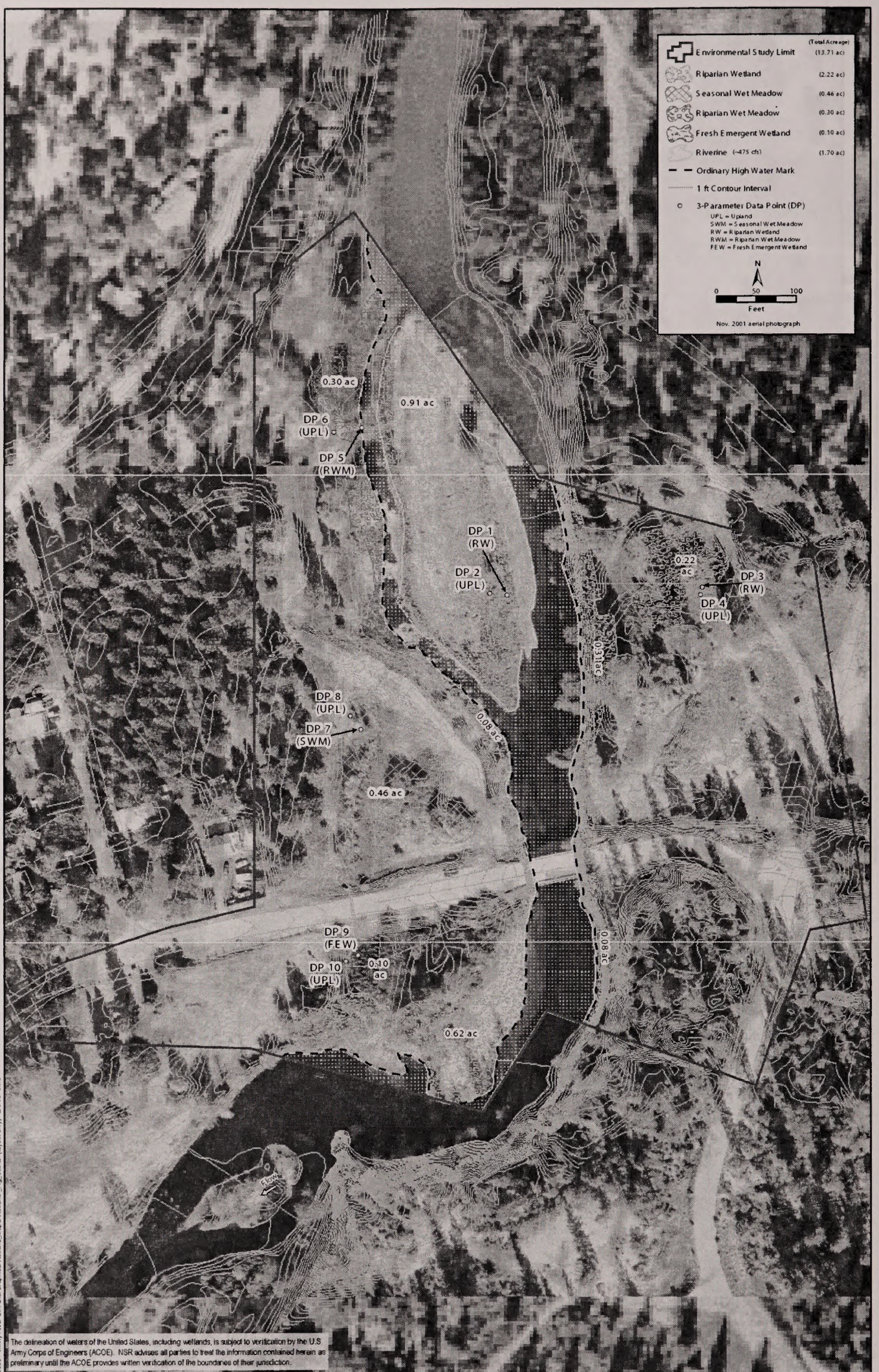

Environmental Study Limit (8.83 ac)
Riparian Wetland (2.14 ac)
Seasonal Wet Meadow (0.01 ac)
Riverine (~475 cfs) (2.48 ac)
Ordinary High Water Mark
1 ft Contour Interval
3-Parameter Data Point (DP)
UPL = Upland
RW = Riparian Wetland
SWM = Seasonal Wet Meadow
N
0
50
100
Feet
Nov. 2001 aerial photograph
0.66 ac
DP 5 (RW)
DP 6 (UPL)
0.09 ac
DP 7 (RW)
0.29 ac
DP 8 (UPL)
0.04 ac
0.07 ac
0.01 ac
0.44 ac
0.23 ac
DP 2 (UPL)
0.01 ac
DP 1 (RW)
DP 3 (SWM)
DP 4 (UPL)
0.31 ac
The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE). NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.
10006 - Trinity River EIR-EIS\Graphics\Wetland_Maps\Wetland_Fig_03a.ai (layout only) 2/3/03 CMS
RDD#10006 - Environmental Survey at Four Bridge Replacement Sites\GIS\10006_Salt_Flat_Wetland.mxd

Figure 3a
Salt Flat Bridge Boundaries of Waters of the U.S. (Including Wetlands)


Environmental Study Limit (Total Acreage) (13.71 ac)
Riparian Wetland (2.22 ac)
Seasonal Wet Meadow (0.46 ac)
Riparian Wet Meadow (0.30 ac)
Fresh Emergent Wetland (0.10 ac)
Riverine (~475 cfs) (1.70 ac)
Ordinary High Water Mark
1 ft Contour Interval
3-Parameter Data Point (DP)
UPL = Upland
SWM = Seasonal Wet Meadow
RW = Riparian Wetland
RWM = Riparian Wet Meadow
FEW = Fresh Emergent Wetland
N
0
50
100
Feet
Nov. 2001 aerial photograph
0.30 ac
0.91 ac
DP 6 (UPL)
DP 5 (RWM)
DP 1 (RW)
DP 2 (UPL)
0.22 ac
DP 3 (RW)
DP 4 (UPL)
0.31 ac
DP 8 (UPL)
DP 7 (SWM)
0.08 ac
0.46 ac
DP 9 (FEW)
DP 10 (UPL)
0.10 ac
0.08 ac
0.62 ac
Flow
The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE). NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

10006 - Trinity River EIR-EIS/Graphics/Wetland_Maps/Wetland...Fig_03b.ai (layout only) 2/3/03 CMS

Figure 3b

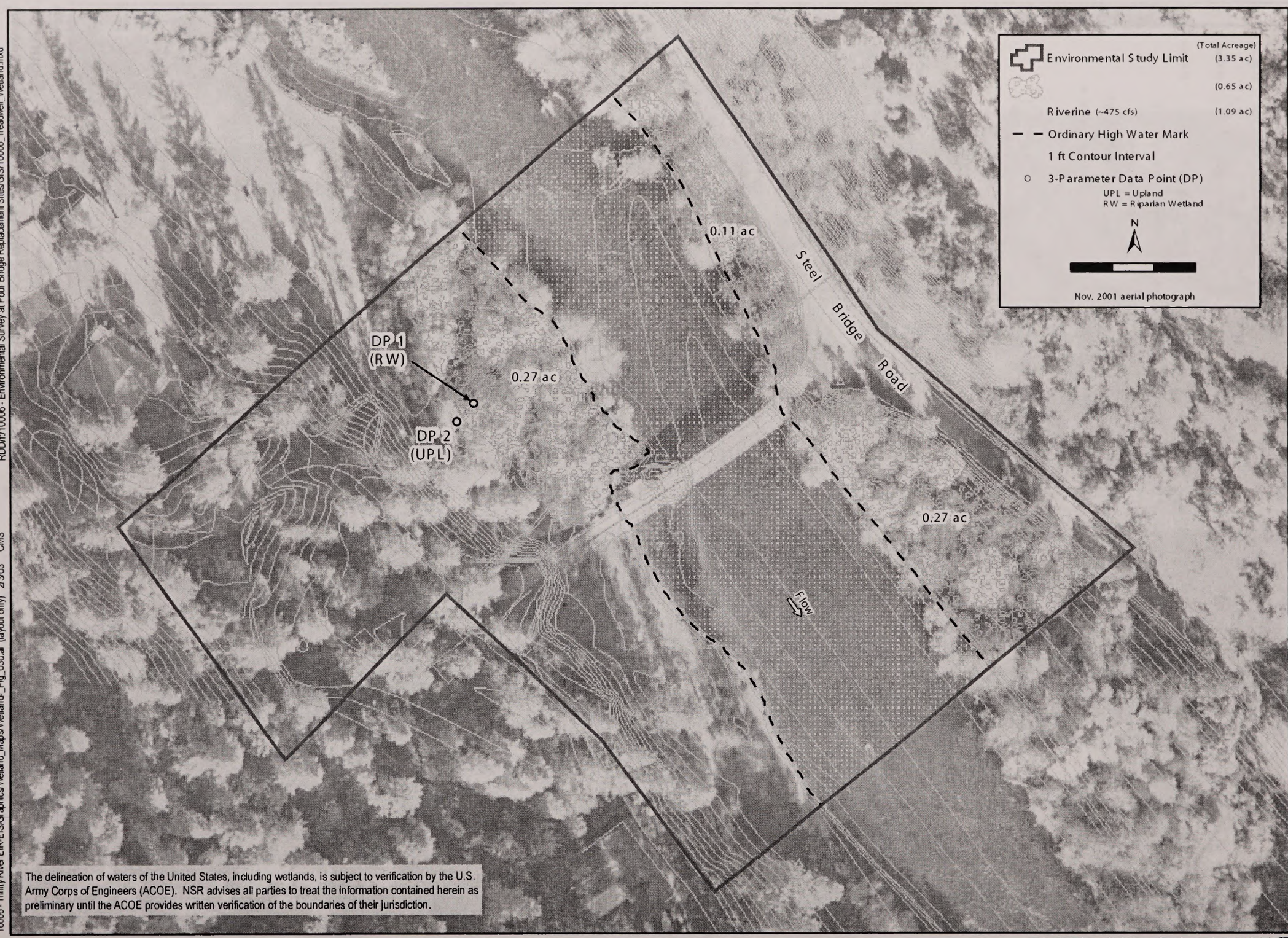
Bucktail Bridge Boundaries of Waters of the U.S. (Including Wetlands)

(Total Acreage)
Environmental Study Limit (7.85 ac)
Riparian Wetland (0.73 ac)
Riverine (~475 cfs) (0.84 ac)
Ordinary High Water Mark
1 ft Contour Interval
3-Parameter Data Point (DP)
UPL = Upland
RW = Riparian Wetland
N
0 50 100
Feet
Nov. 2001 aerial photograph
DP 2 (UPL)
DP 1 (RW)
0.11 ac
0.08 ac
0.21 ac
DP 3 (RW)
0.19 ac
0.05 ac
DP 4 (UPL)
0.04 ac
0.05 ac
Flow
The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE). NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

10006 - Trinity River EIR-EIS\Graphics\Wetland_Maps\Wetland-_Fig_03c.ai (layout only) 2/3/03 CMS

Figure 3c

Poker Bar Bridge Boundaries of Waters of the U.S. (Including Wetlands)


Environmental Study Limit
(Total Acreage)
(3.35 ac)
(0.65 ac)
Riverine (~475 cfs)
(1.09 ac)
Ordinary High Water Mark
1 ft Contour Interval
3-Parameter Data Point (DP)
UPL = Upland
RW = Riparian Wetland
N
Nov. 2001 aerial photograph
0.11 ac
0.27 ac
0.27 ac
DP 1
(RW)
DP 2
(UPL)
Steel
Bridge
Road
Flow
The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (ACOE). NSR advises all parties to treat the information contained herein as preliminary until the ACOE provides written verification of the boundaries of their jurisdiction.

10006 - Trinity River EIR-EIS\Graphics\Wetland_Maps\Wetland-_Fig_03d.ai (layout only) 2/3/03 CMS RDD/f:/10006 - Environmental Survey at Four Bridge Replacement Sites/GIS/10006_Treadwell_Wetland.mxd

Trinity River Bridges Project / 10006

Figure 3d

Biggers Road Bridge Boundaries of Waters of the U.S. (Including Wetlands)

The Trinity River drains a watershed of approximately 2,965 square miles, about one-quarter of which is above Lewiston Dam. Elevations range from 8,888 above feet mean sea level (msl) at Sawtooth Mountain in the Trinity Alps to 300 feet msl at the confluence of the Trinity and Klamath Rivers. The Trinity River is the largest tributary to the Klamath River. The mainstem Trinity River flows a total of 170 miles from its headwaters to its confluence with Klamath River at Weitchpec, 43.5 miles upstream from the Pacific Ocean.

Prior to the completion of the TRD, flows in the Trinity River were highly variable, ranging from summer flows of 25 cubic feet per second (cfs) to extreme winter events with instantaneous peak flows greater than 100,000 cfs. Annual hydrographs typically followed a seasonal pattern of high winter and spring flows followed by low summer and fall flows. Total annual flow volumes at Lewiston ranged from 0.27-2.7 maf, with an average of 1.2 maf.

Since operation of the dam in 1964, an average of 74 percent of the river's flows has been exported annually. In recent years (1985-1997), annual exports have decreased to an average of 732,400 af. Conversely, post-dam Trinity River flows at Lewiston have been as low as 10 percent of pre-dam levels. The flood season on the Trinity River usually lasts from October through April, when over 90 percent of the annual precipitation falls. Floods on the Trinity River are somewhat controlled by the dams upstream of Lewiston.

All four of the bridge sites within the study area support riparian wetlands (montane riparian), which occur adjacent to the Trinity River. The hydrologic regime of the riparian wetlands is influenced by the river, although the wetland features do not always occur within the river's "normal high water mark." Due to fluctuations in the water levels from year to year, some of the riparian wetlands are under water for some parts of the year. In general, the boundary of the riparian wetlands was determined to be the area where hydrology indicators were no longer present. Hydric soil indicators and hydrophytic vegetation were evident throughout most of the area within the "study area" boundaries for each bridge site. Drift lines, water stained leaves, and drainage patterns in the wetlands were used to determine the precise boundaries of the riparian wetlands.

Seasonal wet meadows were present at the Salt Flat and Bucktail sites. The Salt Flat site was dominated by two species, Santa Barbara sedge and poison hemlock. Although these were the only two dominant species within the feature, they represented a significant portion of the vegetative cover and satisfied the hydrophytic vegetation criterion. The hydrology of the feature appeared to be influenced by sheetflow runoff that collects at a low point in the local landscape.

The seasonal wet meadow at the Bucktail site contained similar vegetation species to the riparian wetland but the hydrology appears to be influenced by local sheetflow runoff, as well as the Trinity River. A culvert positioned at one end of the feature provides a mechanism for transporting flow between the seasonal wet meadow and the fresh emergent wetland downstream, dependent on the hydraulic gradient and seasonal conditions. Neither feature is associated with surface runoff other than local sources that provide sheetflow during runoff events.

The single fresh emergent wetland within the study area was found at the Bucktail site. It occurs on the opposite side of Browns Mountain Road to the seasonal wet meadow on the site, south of the road and west of the Trinity River. A culvert conveys water flows under the road between the fresh emergent wetland and the seasonal wet meadow, although the fresh emergent wetland is lower in elevation than the seasonal wet meadow, as evidenced by its inundation in the middle of July. The hydrology of the fresh emergent wetland appears to be driven by sheetflow runoff as well as high flows from the Trinity River. Surrounding the fresh emergent wetland is a riparian thicket dominated by narrow-leafed willow and white alder that borders the river and is included as part of the riparian wetlands (montane riparian community) delineated on the site.

A single riparian wet meadow is located on the north side of Browns Mountain Road on the west bank of the Trinity River at the Bucktail site. The hydrology of the feature is influenced by the river and potentially by runoff from the adjacent rural residential lawns. Although the hydrology and soils indicators are similar to riparian wetlands on the site, the dominant vegetation of the feature is noticeably different. The riparian wet meadow is dominated by herbaceous species and a few scattered hydrophytic trees. It is bordered by the river on the east and two lawns to the west. All three field-indicators of wetlands were present and as such the feature, although it appeared to be regularly disturbed by human activities, was considered a wetland.

There are no isolated waters present within the study area since a water is not considered isolated if, at any time, a feature overflows its banks and connects with another feature that is ultimately connected to a navigable water. In a wet year, all of the features within the study area, upon overflowing their banks, would drain into the Trinity River, which ultimately flows into the Pacific Ocean.

d) **Summary Table of Jurisdictional Acreage: Tables 3a-3d** summarizes the acreages of each wetland type delineated for each bridge site.

TABLE 3A
ACREAGES OF WATERS OF THE U.S. – SALT FLAT

Wetland Type	Total Acreage
Total Wetlands	
Riparian Wetlands	2.14
Seasonal Wet Meadow	0.01
Total Wetlands	**2.15**
Other Waters	
Trinity River (Riverine)	2.48
Total Other Waters	2.48
Total Jurisdictional Waters	**4.63**

TABLE 3B
ACREAGES OF WATERS OF THE U.S. – BUCKTAIL

Wetland Type	Total Acreage
Total Wetlands	
Fresh Emergent Wetland	0.10
Riparian Wetlands	2.22
Seasonal Wet Meadow	0.46
Riparian Wet Meadow	0.30
Total Wetlands	**3.08**
Other Waters	
Trinity River (Riverine)	1.70
Total Other Waters	1.70
Total Jurisdictional Waters	**4.78**

TABLE 3C
ACREAGES OF WATERS OF THE U.S. – POKER BAR

Wetland Type	Total Acreage
Total Wetlands	
Riparian Wetlands	0.73
Total Wetlands	**0.73**
Other Waters	
Trinity River (Riverine)	0.84
Total Other Waters	0.84
Total Jurisdictional Waters	**1.57**

TABLE 3D
ACREAGES OF WATERS OF THE U.S. – BIGGERS ROADROAD

Wetland Type	Total Acreage
Total Wetlands	
Riparian Wetlands	0.65
Total Wetlands	**0.65**
Other Waters	
Trinity River (Riverine)	1.09
Total Other Waters	1.09
Total Jurisdictional Waters	**1.74**

7. REFERENCES

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U.S. Department of Agriculture. 1992. *SCS Field Office Official List of Hydric Soil Map Units for Trinity County, California, Weaverville Area Soil Survey.* US Department of Agriculture, Soil Conservation Service.

APPENDIX A

Data Forms and Soil Map Unit Figure

APPENDIX B

Site Photographs

APPENDIX I

USFWS Special-Status Species List

United States Department of the Interior

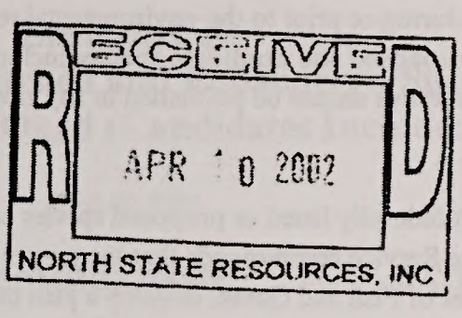
FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201
FAX (707) 822-8136

IN REPLY REFER TO:

1-14-2002-1083

April 9, 2002



Mr. Paul Uncapher
c/o North State Resources
5000 Bechelli Ln, Suite 203
Redding, CA 96002

Subject: Species Lists for Proposed Bridge Rehabilitation/Replacement, Trinity County, California

Dear Mr. Uncapher:

The enclosed lists are in reply to your electronic message dated April 8, 2002, requesting information about the endangered and threatened species that may be present in your project area (see Enclosure A). Information concerning the distribution, life history, and habitat requirements for the listed species is available upon request.

The Fish and Wildlife Service (Service) used your map(s) and/or other information to determine the U.S.G.S. 7.5' quadrangle(s) containing the proposed project. The species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within* the Weaverville, Lewiston, Helena, and Dedrick quads.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action.

Additional information concerning listed and candidate species in California are available from the California Natural Diversity Data Base, a program of the California Department of Fish and Game. Address your request to: Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814 (916)322-2493.

All listed species identified in Enclosure A are fully protected under the mandates of the Endangered Species Act of 1973, as amended (Act). Section 9 of the Act and its implementing regulations prohibit the "take" of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such wildlife species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency

is involved with the permitting, funding, or carrying out of this project, then initiation of formal consultation between that agency and the Service pursuant to section 7 of the Act is required if it is determined that the proposed project may affect a federally listed species. Such consultation would result in a biological opinion that addresses anticipated effects of the project to listed and proposed species and may authorize a limited level of incidental take. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an "incidental take" permit pursuant to section 10(a) of the Act should be obtained. The Service may issue such a permit upon completion by the permit applicant of a satisfactory conservation plan for the listed species that would be affected by the project.

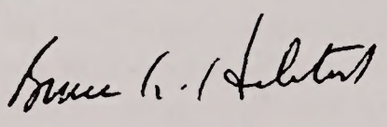
If suitable habitat for federally listed species exists in the project area, we recommend that surveys for them be undertaken by qualified biologists during or prior to the environmental review process. We also recommend that surveys be undertaken for the proposed and candidate species included in Enclosure A if suitable habitat exists on site. The results of these surveys should be published in any environmental documents prepared for this project.

Should these surveys determine that federally listed or proposed species occur in the area and are likely to be affected by the proposed project, the Service recommends that the project proponent, in consultation with this office and the California Department of Fish and Game, develop a plan that mitigates for the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. The mitigation plan also should be included in the environmental document.

We also recommend addressing adverse impacts to candidate species. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing as endangered or threatened. One of the benefits of considering these species early in the planning process is that by exploring alternatives, it may be possible to avoid conflicts that could develop, should a candidate species become listed before the project is complete.

We appreciate your concern for endangered species. If you have further questions, please call Mr. Greg Goldsmith of this office at (707) 822-7201. For the fastest response to species list requests, address them to the attention of the species list coordinator at this address. For questions regarding wetlands, please contact Mr. Randy Brown of this office at (707) 822-7201.

Sincerely,



Bruce G. Halstead
Project Leader

Enclosure

Enclosure A
Listed/Proposed Threatened and Endangered Species for the LEWISTON Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus tshawytscha*	winter-run chinook salmon	E	Y
	Pogonichthys macrolepidotus	Sacramento splittail	T	N
	Hypomesus transpacificus	delta smelt	T	Y
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the WEAVERVILLE Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the HELENA Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure A
Listed/Proposed Threatened and Endangered Species for the DEDRICK Quad (Candidates Included)

April 09,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

APPENDIX J

Hydraulic Scour and Riprap Sizing Analysis

Trinity River Restoration Program
Trinity River Bridges:
Hydraulic, Scour, and Riprap Sizing Analysis

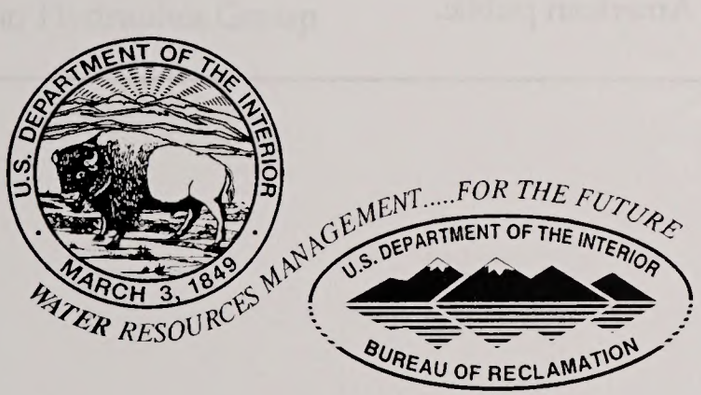
US DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

TECHNICAL SERVICE CENTER

Prepared by

Kent L. Collins


U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849
WATER RESOURCES MANAGEMENT.....FOR THE FUTURE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

April 9, 2003

DEPARTMENT OF THE INTERIOR'S MISSION

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

RECLAMATION'S MISSION

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Trinity River Bridges:
Hydraulic, Scour, and Riprap Sizing Analysis
Denver, CO

SIGNATURE PAGE

Prepared by:

Kent L. Collins, Hydraulic Engineer
Sedimentation and River Hydraulics Group

Date Apr 19, 2005

Peer Reviewed by:

Mitchell R. Delcau, Hydraulic Engineer
Sedimentation and River Hydraulics Group

Date 4/9/05

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1. INTRODUCTION

Trinity and Lewiston Dams were constructed on the Trinity River in Northern California as part of the Trinity River Division (TRD) of the Central Valley Project (CVP). Since dam operations began in 1963, the TRD has diverted up to 90 percent of the Trinity River's average annual yield at Lewiston, California. Forty years of limited flow releases from Lewiston Dam have greatly reduced the ability of the downstream river to transport coarse sediments. The change in downstream river morphology has degraded riverine habitats, resulting in a sharp decline in salmon and steelhead populations.

In an effort to rehabilitate downstream fish habitat and partially restore the ability of the Trinity River to transport coarse sediments, the Trinity River Restoration Program (TRRP) of the Bureau of Reclamation (BOR) is considering increased flow releases from Lewiston Dam into the Trinity River mainstem. Implementation of an increased flow release schedule, recommended in the *Trinity River Flow Evaluation Final Report* (US Fish and Wildlife Service and Hoopa Valley Tribe, 1999), requires modification of four existing downstream bridges to accommodate higher flows and minimize potential damage to existing structures and personal property caused by increased flow releases.

The Sedimentation and River Hydraulics Group of the BOR's Technical Service Center (TSC) in Denver, Colorado was asked to perform hydraulic, scour, and riprap sizing analyses at the four bridge sites being considered for modification. These analyses were completed for three separate alternatives at each of the four bridge sites. At Salt Flat Bridge, Bucktail Bridge, Poker Bar Bridges, and Treadwell/Bigger's Road Bridge, the existing condition, a preferred alternative, and a second alternative were thoroughly investigated. The three alternatives were designated No Action, Proposed Action, and Alternative 1 respectively in the Environmental Assessment documentation.

2. HYDROLOGY

Flood flow estimates used in the hydraulic modeling, scour computations, and riprap sizing were taken from the *Trinity River Bridge Hydrologic Analysis* draft report (BOR, 2002) and from the *Estimation of 50-and 100-Year Tributary Accretion Floods* document (McBain, 2002). BOR hydrologists estimated the 50-year and 100-year flood flows at the four bridge sites based on potential Lewiston Dam releases and contributions from major intervening tributaries downstream (BOR, 2002). Multiple combinations of seasonal tributary flows and dam release scenarios were examined in the hydrologic analysis. The discharges used in the hydraulic, scour, and riprap analyses all assumed a Record of Decision (ROD) or maximum controlled release from Lewiston Dam. The Record of Decision was approved in December of 2000 for the restoration of fish and wildlife on the Trinity River mainstem. The ROD could result in Lewiston Dam releases as high as 11,000 ft^3/s.

The magnitude of the January 1, 1997 flood at each of the four bridge sites was estimated in McBain's 2002 report. The longitudinal magnitude of the 1997 flood was evaluated by combining a measured mainstem release of 6,140 ft^3/s from Lewiston Dam with a series of gaging stations and site-specific hydraulic estimates (McBain, 2002). The resulting flood estimates were used in the analyses at each bridge site. Tables 1-4 present flood flows modeled and their respective classifications at each of the four bridge sites.

Table 1. Design flood flows analyzed at Salt Flat

Flood Flow Magnitude (ft^3/s)	Classification/Hydrology Scenario
11,000	January 1, 1997 Flood Flow
11,600	Spring - Combined all Scenarios: Q_{50} w/ ROD (11,000 ft^3/s) Release
11,700	Spring - Combined all Scenarios: Q_{100} w/ ROD (11,000 ft^3/s) Release
11,700	Annual: Q_{50} w/ ROD (11,000 ft^3/s) Release
12,900	Annual: Q_{100} w/ ROD (11,000 ft^3/s) Release
14,700	Spring: Tributary Q_{50} w/ Max Controlled (13,750 ft^3/s) Release
14,900	Spring: Tributary Q_{100} w/ Max Controlled (13,750 ft^3/s) Release

Table 2. Design flood flows analyzed at Bucktail

Flood Flow Magnitude (ft^3/s)	Classification/Hydrology Scenario
11,000	January 1, 1997 Flood Flow
11,600	Spring - Combined all Scenarios: Q_{50} w/ ROD (11,000 ft^3/s) Release
11,700	Spring - Combined all Scenarios: Q_{100} w/ ROD (11,000 ft^3/s) Release
11,700	Annual: Q_{50} w/ ROD (11,000 ft^3/s) Release
13,100	Annual: Q_{100} w/ ROD (11,000 ft^3/s) Release
14,700	Spring: Tributary Q_{50} w/ Max Controlled (13,750 ft^3/s) Release
15,000	Spring: Tributary Q_{100} w/ Max Controlled (13,750 ft^3/s) Release

Table 3. Design flood flows analyzed at Poker Bar

Flood Flow Magnitude (ft^3/s)	Classification/Hydrology Scenario
12,200	Spring - Combined all Scenarios: Q_{50} w/ ROD (11,000 ft^3/s) Release
12,400	Spring - Combined all Scenarios: Q_{100} w/ ROD (11,000 ft^3/s) Release
15,000	January 1, 1997 Flood Flow
16,400	Spring: Tributary Q_{50} w/ Max Controlled (13,750 ft^3/s) Release
17,000	Spring: Tributary Q_{100} w/ Max Controlled (13,750 ft^3/s) Release
18,500	Annual: Q_{50} w/ ROD (11,000 ft^3/s) Release
23,400	Annual: Q_{100} w/ ROD (11,000 ft^3/s) Release

Table 4. Design flood flows analyzed at Treadwell

Flood Flow Magnitude (ft^3/s)	Classification/Hydrology Scenario
12,300	Spring - Combined all Scenarios: Q_{50} w/ ROD (11,000 ft^3/s) Release
12,500	Spring - Combined all Scenarios: Q_{100} w/ ROD (11,000 ft^3/s) Release
15,000	January 1, 1997 Flood Flow
16,600	Spring: Tributary Q_{50} w/ Max Controlled (13,750 ft^3/s) Release
17,200	Spring: Tributary Q_{100} w/ Max Controlled (13,750 ft^3/s) Release
19,100	Annual: Q_{50} w/ ROD (11,000 ft^3/s) Release
24,700	Annual: Q_{100} w/ ROD (11,000 ft^3/s) Release

The majority of the results presented in the Hydraulic Analysis, Scour Analysis, and Riprap Sizing sections of this report (sections 3., 4., and 5. respectively) are for the 100-year, with ROD release, annual tributary hydrology scenario[1]. Use of this flow provided a baseline for comparison of hydraulic model, scour computation, and riprap sizing results for the various alternatives. This flow also played a key role in determining many design details at the four sites. The specific methods used to compute this estimated flow are detailed in the *Trinity River Bridge Hydrologic Analysis* draft report (BOR, 2002).

[1] This flood flow at each bridge site is simply referred to as the Q_{100} or 100-year flow in the remainder of this report.

3. HYDRAULIC ANALYSIS

Hydraulic modeling at all four bridge sites was performed using HEC-RAS. HEC-RAS is a numerical modeling software package developed by the Hydrologic Engineering Center for the US Army Corps of Engineers for performing one-dimensional, steady and unsteady flow, hydraulic computations (Brunner, 2001). Results of the hydraulic modeling were used to assess the effectiveness and determine potential impacts of each bridge alternative for various flow release and hydrology scenarios. In addition, hydraulic model output provided input for scour computations.

3.1. Model Assumptions

To begin the hydraulic backwater computations, the flow at the downstream end of each HEC-RAS model was assumed to be at normal depth. The slope of the energy grade line at the downstream end of the model (used to compute normal depth) was estimated as equal to the slope of the longitudinal thalweg profile from the bridge downstream one mile.

During the period from 1999 to 2001, the California Department of Water Resources (DWR) collected cross section survey data in the vicinity of all four bridges. This data was used to construct the base geometry files for the No Action Alternative hydraulic models. To supplement the 1999-2001 cross section geometry where necessary (extend overbanks vertically and horizontally and lengthen the model reach upstream and downstream of each bridge), survey data collected by the DWR prior to 1997 was used.

Visual inspection of the 1999-2001 and pre-1997 Department of Water Resources survey data confirmed that the overall cross section geometry in the modeled reaches had not changed considerably since the previous survey. The relatively high flows that occurred on the Trinity River in January 1997 had negligible long-term effects on the shape of most cross sections in the vicinity of Treadwell Bridge. Due to this similarity in cross section geometry between the 1999-2001 and pre-1997 surveys, the current water surface elevations at 5,000 ft^3/s were assumed to also be similar to those measured by the DWR at 5,000 ft^3/s before the 1997 flood flow. The significance of this assumption is discussed briefly under the Model Calibration heading below.

3.2. Model Calibration

Prior to the January 1997 flood, the DWR surveyed water surface elevations at 5,000 ft^3/s at a limited number of cross sections in the modeled reaches. As previously stated, the pre-and post-1997 cross section comparison indicated that

channel geometry is similar. Therefore, the pre-1997 DWR surveyed water surface elevations at 5,000 ft^3/s were used to calibrate the HEC-RAS models at the four existing bridge sites created primarily from 1999-2001 geometry.

Main channel Manning's roughness values in each model were adjusted over a range from 0.030 to 0.050 to match DWR surveyed water surface elevations within 0.5 feet for a 5,000 ft^3/s discharge. Calibrated overbank Manning's roughness values typically varied between 0.080 and 0.100. Figures A-1 through A-4 in the appendix are plots of the model calibration results showing computed versus measured water surface elevations in the vicinity of each of the four existing bridges.

As an additional check of calculated water surface elevations, model results were compared to observed water surface elevations during the January 1, 1997 flood event at each bridge site. The magnitude of the 1997 flood, estimated to be 11,000 ft^3/s at the Salt Flat and Bucktail bridges and 15,000 ft^3/s at the Poker Bar and Treadwell bridges (McBain, 2002), provided confirmation of model results at higher flows. Computed water surface elevations at the four bridges for the 1997 flood flow matched reasonably well with eye-witness accounts of the event at each bridge site.

The individual, calibrated HEC-RAS models for the existing bridges became the baseline for the hydraulic analysis and alternative evaluation at each of the four bridge sites. The hydraulic model for each existing bridge was used to create the geometry files for every alternative examined. Hydraulic computations were performed for multiple combinations of river flows and potential bridge and channel geometries in the respective reaches to evaluate various alternatives. An iterative design process between the TSC's Sedimentation and River Hydraulics Group, Water Conveyance Group, and the Trinity River Restoration Program resulted in the selection of a Proposed Action Alternative and an Alternative 1 at each bridge site. A more detailed hydraulic analysis was conducted for the No Action, Proposed Action, and Alternative 1 scenarios using the latest flood flow estimates based on numerous dam release scenarios and potential downstream hydrology (McBain, 2002 and BOR, 2002).

3.3. Salt Flat Site

The Salt Flat Bridge site is the furthest upstream of the four bridge sites analyzed. No action, proposed action, and Alternative 1 scenarios were examined in detail at this site. Each alternative modeled consisted of a single channel in a relatively straight reach near or at the location of the existing bridge. A series of six different flows (Table 1) were modeled at the Salt Flat site.

3.3.1. No Action Alternative

The existing Salt Flat bridge (Appendix Figure A-5) is a narrow, three span, primarily steel structure across the mainstem of the Trinity River approximately 5 river miles downstream of Lewiston Dam at river mile 106.935 (RM 106.935). This bridge can pass approximately 7,750 ft^3/s under the low chord and the bridge deck overtops at about 11,000 ft^3/s (eyewitness accounts). Table 5 summarizes the results of the hydraulic modeling for the 100-year flood flow at various locations throughout the Salt Flat reach for the No Action Alternative.

Table 5. Hydraulic model results for 100-year flood flow (w/ROD - annual) Salt Flat, No Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation[2] (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
107.01	12,900	1770.6	1781.0	6.9
106.94	12,900	1766.1	1780.4	5.9
106.935	Bridge	Bridge	Bridge	Bridge
106.93	12,900	1765.4	1779.8	6.3
106.90	12,900	1764.7	1779.0	9.6
106.76	12,900	1764.5	1777.3	9.6
106.67	12,900	1763.9	1776.5	6.7
106.65	12,900	1764.2	1776.3	6.5
106.60	12,900	1762.9	1773.9	7.3
106.35	12,900	1760.5	1772.1	7.4
106.13	12,900	1756.85	1770.0	8.4
105.99	12,900	1757.34	1768.6	7.8

Table 6 shows some of the hydraulic properties at the Salt Flat Bridge for all flows modeled for the No Action Alternative. The discharge under the bridge represents flow that passes under the bridge as either free surface or pressure flow. Flow that does not pass under the bridge, overtops the bridge or approach embankments and is designated as weir flow. The heading WSEL in Table 6 is used as an abbreviation for the term water surface elevation.

[2] All elevations presented in this report are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Table 6. Hydraulic model results at existing Salt Flat Bridge for all hydrology No Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
11,000	11,000	0	1779.5	6.2
11,600	11,600	0	1779.9	6.5
11,700	11,700	0	1780.0	6.6
12,900	11,739	1,161	1780.4	6.6
14,700	11,853	2,847	1781.1	6.6
14,900	11,861	3,039	1781.1	6.6

Table 6 shows no overtopping/weir flow for 11,000 ft^3/s (approximate overtopping flow identified above). According to eyewitnesses, the January 1, 1997 flood (estimated to be approximately 11,000 ft^3/s; McBain, 2002) overtopped the bridge deck at Salt Flat by 1-3 inches. Hydraulic modeling shows that the 11,000 ft^3/s flow approaching the bridge on the upstream side is near the top of the bridge deck but the water surface drawdown, due to the bridge contraction, results in all of the flow passing underneath the bridge as pressure flow. These results are within the accuracy limits of the hydraulic model considering the accuracy of the model calibration (±0.5 ft for 5,000 ft^3/s) and the inherent error in the January 1, 1997 flood magnitude estimation. Flood flows 11,600 and 11,700 ft^3/s do not overtop the bridge in the model computations for the same reasons stated above.

Detailed results of the hydraulic modeling appear in the appendix in Tables A-1 through A-20. These appendix tables contain HEC-RAS output[3] for all flows modeled and all options examined in depth at each of the four bridge sites.

3.3.2. Proposed Action Alternative

The proposed action at Salt Flat involves construction of a 280 ft-long, two span, steel truss bridge immediately downstream of the existing bridge (Appendix Figure A-6). The low chord elevation of the new steel bridge would be set to pass all flows up to the maximum controlled dam release combined with a 100-year spring tributary flood (14,900 ft^3/s). Under this scenario, the existing bridge and abutments would eventually be completely removed. Model results for the 100-year flood flow are presented below in Table 7 for the proposed action.

---

[3] Even though HEC-RAS hydraulic properties tables present most data with two or more decimal places, the accuracy of computed water surface elevation and flow depth data is no more than ±0.5 feet. Computed flow velocities are accurate within 0.5 feet/second. No further accuracy is either expressed or implied.

Table 7. Hydraulic model results for 100-year flood flow (w/ROD - annual) Salt Flat, Proposed Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
107.01	12,900	1770.6	1780.6	7.3
106.94	12,900	1766.1	1779.9	6.2
106.935	Bridge	Bridge	Bridge	Bridge
106.93	12,900	1765.4	1779.8	6.3
106.90	12,900	1764.7	1779.0	9.6
106.76	12,900	1764.5	1777.3	9.6
106.67	12,900	1763.9	1776.5	6.7
106.65	12,900	1764.2	1776.3	6.5
106.60	12,900	1762.9	1773.9	7.3
106.35	12,900	1760.5	1772.1	7.4
106.13	12,900	1756.85	1769.9	8.4
105.99	12,900	1757.34	1768.6	7.8

Table 8 shows hydraulic properties at the proposed steel truss Salt Flat Bridge for all flows.

Table 8. Hydraulic model results at proposed Salt Flat Bridge for all hydrology Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
11,000	11,000	0	1779.0	5.1
11,600	11,600	0	1779.3	5.2
11,700	11,700	0	1779.4	5.2
12,900	12,900	0	1779.9	5.4
14,700	14,700	0	1780.6	5.8
14,900	14,900	0	1780.6	5.8

Comparison of hydraulic results for the No Action and Proposed Action Alternatives show that installation of the proposed, downstream, steel truss bridge reduces the water surface elevation upstream of the bridge by approximately 0.5 ft for 12,900 ft^3/s. Average channel velocities upstream of the bridge increase for the proposed action. Lower upstream velocities for the existing bridge are most likely a result of backwater caused by the existing bridge contraction and the bridge deck impeding the flow. Underneath the bridge, velocities are higher for the existing bridge due to bridge contraction and pressure flow that occurs for all flows modeled.

If landowner and other restrictive issues can be solved, the implementation of the Proposed Action Alternative would improve the ability of the Trinity River at

Salt Flat to pass increased dam release flows with less impact to the surrounding environment.

3.3.3. Alternative 1

Alternative 1 at Salt Flat consists of constructing a new steel truss bridge upstream of the existing bridge with the same geometry as the downstream bridge in the Proposed Action Alternative (Appendix Figure A-7). The existing bridge and abutments would eventually be removed after completion of the new structure. No hydraulic model was constructed or executed to analyze this option. Due to its similarity to the Proposed Action bridge in location and configuration, the hydraulic properties for the Alternative 1 bridge are assumed to be the same as those generated for the Proposed Action Alternative.

3.4. Bucktail Site

The Bucktail Bridge site is the next site downstream of Salt Flat being considered for modification. This site is in a relatively straight reach just upstream of a tight bend. Numerous private residences are located on the right bank (looking downstream) immediately upstream of the bridge near the river channel. No action, Proposed Action, and Alternative 1 options were modeled at the Bucktail site. Six different flows (Table 2) were modeled for all three alternatives at the Bucktail site.

3.4.1. No Action Alternative

Bucktail Bridge is the newest of the four existing bridges (Appendix Figure A-8). Constructed in the mid-1980's, the bridge is located on the Trinity River approximately 7 river miles downstream of Lewiston Dam at RM 105.035. A 30-inch diameter corrugated metal pipe (CMP) culvert passes under the road about 250 ft to the west of the center of the bridge. The road profile dips to the west of the bridge, reaching its lowest elevation above the culvert before rising again. Flood flows cause full flow through the culvert and weir flow over the road above the culvert.

A right bank levee designed to limit flow through the culvert channel and a narrow bridge opening create a significant contraction entering the bridge. This contraction increases channel velocities at the bridge and results in a noticeable water surface drawdown at higher flows. The existing bridge can pass about 13,500 ft^3/s below the low chord while approximately 18,300 ft^3/s is required to overtop the deck. The current right bank levee allows flow through the culvert when discharges reach approximately 7,000 ft^3/s. However, a flow of 7,800 ft^3/s in the culvert channel to the west of the levee is necessary to overtop the road

above the culvert, resulting in weir flow over the embankment. Hydraulic model results are shown in Table 9 for the No Action Alternative for the 100-year flow (Table 2).

Table 9. Hydraulic model results for 100-year flood flow (w/ROD - annual) Bucktail, No Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
105.17	13,100	1746.5	1760.1	7.2
105.14	13,100	1745.7	1760.2	5.4
105.08	13,100	1745.2	1759.8	5.6
105.07	13,100	1745.2	1759.9	5.7
105.04	13,100	1740	1757.5	12.3
105.035	Mult Open	Mult Open	Mult Open	Mult Open
105.03	13,100	1739.3	1756.9	11.0
105.01	13,100	1742.5	1756.8	9.1
104.94	13,100	1740.7	1756.6	6.0
104.90	13,100	1742.8	1755.8	9.1
104.83	13,100	1740.7	1755.2	7.5
104.82	13,100	1739.4	1754.7	9.2
104.77	13,100	1739.7	1754.1	7.8
104.68	13,100	1738.4	1753.4	7.7
104.48	13,100	1738.14	1751.5	8.5
104.43	13,100	1738.02	1751.3	8.1
104.11	13,100	1737.35	1749.3	7.8
103.90	13,100	1734.11	1748.0	7.7

Tables 10 and 11 summarize results of hydraulic computations at the existing bridge and culvert respectively for all flows modeled. Notice that the water surface elevation upstream of the culvert is higher than for the bridge at the same flow. This represents the water surface drawdown resulting from flow contraction and velocity increase at the bridge. Flow velocities are lower in the overbanks where no contraction occurs and the roughness values are higher.

Table 10. Hydraulic model results at existing Bucktail Bridge for all hydrology No Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
11,000	10,956	0	1755.1	13.5
11,600	11,528	0	1755.3	14.0
11,700	11,617	0	1755.4	14.1
13,100	12,905	0	1755.9	15.9
14,700	14,222	0	1756.8	16.5
15,000	14,476	0	1756.9	16.6

Table 11. Hydraulic model results at existing Bucktail culvert for all hydrology No Action Alternative

Total Discharge (ft^3/s)	Discharge Through Culvert (ft^3/s)	Discharge Over Road/Weir (ft^3/s)	WSEL at Upstream Face of Culvert (ft)	Avg. Velocity Through Culvert (ft/s)
11,000	14	31	1757.7	2.8
11,600	13	59	1758.0	2.7
11,700	14	68	1758.1	2.9
13,100	16	179	1759.0	3.4
14,700	20	459	1760.0	4.0
15,000	20	504	1760.2	4.1

For 11,000 ft^3/s (estimated January 1, 1997 flood flow at Bucktail Bridge) at the existing Bucktail Bridge and CMP, model results show that flow is 1.5 ft deep over road surface above the culvert and approximately 2.7 ft below the low chord of the bridge. These results correspond well with eyewitness accounts of flooding that occurred during the January 1, 1997 event. Witnesses stated that the water was near but below the bridge low chord, and overtopping the road over the culvert by 1-2 feet. This illustrates the local water surface drawdown phenomenon at the bridge.

The results summary tables for the Bucktail site display detailed computed culvert hydraulic properties (Tables A-5 – A-10 in the appendix). From the tables, the flow split between the bridge and culvert can be determined as well as the split between weir/overtopping flow and flow through the culvert or bridge.

3.4.2. Proposed Action Alternative

The proposed action at the Bucktail site (Appendix Figure A-9) consists of leaving the existing bridge and right bank levee in place, replacing the existing 30-inch CMP with a 9.0 ft by 3.875 ft low arch CMP, and raising the road over the new culvert to elevation 1760.5 ft to prevent the road from overtopping during the with ROD release – spring hydrology, 100-year flood flow (11,700 ft^3/s). The size of the new arch culvert was selected to provide a flow split between the bridge and new culvert similar to the existing bridge and culvert for 11,000 ft^3/s (estimated January 1, 1997 flood flow). The detailed hydraulic tables in the appendix show that for 11,000 ft^3/s, the flow split between the bridge and culvert/weir is 10,923 ft^3/s and 77 ft^3/s respectively for the proposed action (Table A-8). This compares closely to the flow split for the existing bridge and culvert: 10,956 ft^3/s, bridge and 44 ft^3/s, culvert/weir for a total discharge of 11,000 ft^3/s (Table A-6). Results of the hydraulic modeling for the 100-year flow (Table 2) throughout the modeled reach are presented in Table 12.

Table 12. Hydraulic model results for 100-year flood flow (w/ROD - annual) Bucktail, Proposed Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
105.17	13,100	1746.5	1759.8	7.4
105.14	13,100	1745.7	1759.9	5.6
105.08	13,100	1745.2	1759.4	6.0
105.07	13,100	1745.2	1759.4	6.0
105.04	13,100	1740	1756.8	13.0
105.035	Mult Open	Mult Open	Mult Open	Mult Open
105.03	13,100	1739.3	1755.9	14.2
105.01	13,100	1742.5	1756.8	9.1
104.94	13,100	1740.7	1756.6	6.0
104.90	13,100	1742.8	1755.8	9.1
104.83	13,100	1740.7	1755.2	7.5
104.82	13,100	1739.4	1754.7	9.2
104.77	13,100	1739.7	1754.1	7.8
104.68	13,100	1738.4	1753.4	7.7
104.48	13,100	1738.14	1751.5	8.5
104.43	13,100	1738.02	1751.3	8.1
104.11	13,100	1737.35	1749.3	7.8
103.90	13,100	1734.11	1748.0	7.7

Tables 13 and 14 show computed hydraulic properties at the Bucktail Bridge and low arch culvert for all flows modeled for the Proposed Action Alternative.

Table 13. Hydraulic model results at existing Bucktail Bridge for all hydrology Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
11,000	10,923	0	1755.6	12.8
11,600	11,521	0	1755.9	13.2
11,700	11,620	0	1755.9	13.3
13,100	13,012	0	1756.4	14.7
14,700	14,597	0	1757.1	16.3
15,000	14,893	0	1757.3	16.7

Table 14. Hydraulic model results at low arch Bucktail culvert for all hydrology Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Through Culvert (ft^3/s)	Discharge Over Road/Weir (ft^3/s)	WSEL at Upstream Face of Culvert (ft)	Avg. Velocity Through Culvert (ft/s)
11,000	77	0	1757.9	0
11,600	79	0	1758.3	0
11,700	80	0	1758.4	0
13,100	88	0	1759.3	0
14,700	103	0	1760.3	0
15,000	107	0.5	1760.6	3.9

Tables 13 and 14 indicate that installing the proposed low arch CMP and raising the road over the culvert from 1756.2 ft (existing low elevation) to 1760.5 ft prevents overtopping above the culvert until a total discharge of about 15,000 ft^3/s (107 ft^3/s through culvert channel) is reached. Implementation of the Proposed Action Alternative may lower water surface elevations a few tenths of a foot upstream of the bridge, but they should be nearly the same as for the existing conditions for the same flood flows due to the similarity in flow split between the two alternatives. Thus, upstream flooding impacts of the proposed action would likely be negligible.

In the immediate vicinity of the bridge, the hydraulic model indicates that the water surface elevation increases while flow velocities decrease for the proposed action (Tables 10 and 13). These differences between the No Action and Proposed Action Alternatives may be attributed to variations in the flow split, culvert hydraulics, or the way the multiple opening analysis is performed in the hydraulic model. The decrease in flow velocity through the bridge opening can be explained by continuity. If flow area increases for a constant discharge, velocity must decrease. An increase in water surface elevation results in a larger cross sectional flow area and a lower average flow velocity.

3.4.3. Alternative 1

Alternative 1 modifications at the Bucktail site (Appendix Figure A-10) were intended to prevent water from overtopping the right bank levee upstream of the bridge for flows at or below 11,700 ft^3/s (with ROD release – spring hydrology, 100-year flood flow). The levee would also be extended upstream slightly to protect some of the existing residences from potential flooding. In the hydraulic model, the existing bridge and 30-inch CMP were left in place and the levee on the right bank upstream of the bridge was raised to the computed elevation of the 11,700 ft^3/s flow + 0.5 ft where necessary. Where the existing top of levee elevation was above the 11,700 ft^3/s water surface elevation + 0.5 ft, no

modifications were made. The results of the hydraulic computations for 13,100 ft^3/s are summarized in Table 15.

Table 15. Hydraulic model results for 100-year flood flow (w/ROD - annual) Alternative 1

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
105.17	13,100	1746.5	1760.2	7.1
105.14	13,100	1745.7	1760.3	5.4
105.08	13,100	1745.2	1759.7	6.2
105.07	13,100	1745.2	1759.9	5.7
105.04	13,100	1740	1757.5	12.3
105.035	Mult Open	Mult Open	Mult Open	Mult Open
105.03	13,100	1739.3	1756.9	11.0
105.01	13,100	1742.5	1756.8	9.1
104.94	13,100	1740.7	1756.6	6.0
104.90	13,100	1742.8	1755.8	9.1
104.83	13,100	1740.7	1755.2	7.5
104.82	13,100	1739.4	1754.7	9.2
104.77	13,100	1739.7	1754.1	7.8
104.68	13,100	1738.4	1753.4	7.7
104.48	13,100	1738.14	1751.5	8.5
104.43	13,100	1738.02	1751.3	8.1
104.11	13,100	1737.35	1749.3	7.8
103.90	13,100	1734.11	1748.0	7.7

Computed water surface elevations and average channel flow velocities at cross sections upstream of the bridge for Alternative 1 are nearly identical to those for the No Action Alternative. The similarity of the hydraulic model results is due to the identical flow split between the bridge/main channel and culvert channel for the two alternatives. For a total discharge of 13,100 ft^3/s, both alternatives show 12,905 ft^3/s flowing under Bucktail Bridge and 195 ft^3/s flowing over the right bank levee and into the culvert channel upstream of the bridge (see Tables 10 and 11 above and Tables 16 and 17 below).

Table 16. Hydraulic model results at existing Bucktail Bridge for all hydrology Alternative 1

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
11,000	11,000	0	1755.2	13.4
11,600	11,600	0	1755.3	14.2
11,700	11,700	0	1755.3	14.4
13,100	12,905	0	1755.9	15.9
14,700	14,237	0	1756.8	16.5
15,000	14,476	0	1756.9	16.6

Table 17. Hydraulic model results at low arch Bucktail culvert for all hydrology Alternative 1

Total Discharge (ft^3/s)	Discharge Through Culvert (ft^3/s)	Discharge Over Road/Weir (ft^3/s)	WSEL at Upstream Face of Culvert (ft)	Avg. Velocity Through Culvert (ft/s)
11,000	0	0	No Flow	0
11,600	0	0	No Flow	0
11,700	0	0	No Flow	0
13,100	16	179	1759.0	3.4
14,700	19	444	1760.0	4.0
15,000	20	504	1760.2	4.1

For a 11,700 ft^3/s total discharge, the appendix tables show that the computed water surface elevations upstream of the bridge decrease for the Alternative 1 scenario when compared to the No Action Alternative (Tables A-5 and A-9). Alternative 1 forces the entire 11,700 ft^3/s under the bridge while only 11,617 ft^3/s passes under the bridge for the No Action Alternative. The additional bridge flow for Alternative 1 increases the effect of the bridge contraction and increases flow velocity beneath the bridge, lowering the water surface elevation. As a result, raising the right bank levee has no negative impact on potential right bank flooding upstream of Bucktail Bridge. However, higher flow velocities under the bridge increase scour potential there.

Raising the right bank levee does confine the 11,700 ft^3/s flow to the main channel upstream of the bridge, but model results indicate that the road above the culvert is still inundated due to backwater downstream of the bridge. A hard rock outcrop seated in the left bank downstream of the bridge protrudes into the main channel constricting flow and forcing a sharp turn in the direction of river flow. At high flows, the rock outcrop causes backwater to encroach on the road embankment downstream of the existing culvert. Table A-10 in the appendix shows that for 11,700 ft^3/s, the water surface downstream of the culvert would be above the top of the road at that location.

3.5. Poker Bar Site

At the Poker Bar site, a central island splits the low flow into two narrow channels (approximate 50 ft top width per channel at 450 ft^3/s total discharge). The left channel (looking downstream) at the bridge is deeper than the right channel and carries the majority of the discharge for most of the flows modeled. At this site, No Action, Proposed Action, and Alternative 1 options were investigated. Seven different flood flow estimates from different hydrology scenarios (Table 3) were used in the hydraulic models.

3.5.1. No Action Alternative

The island splitting the low flow extends roughly 1,100 ft upstream and 1,100 ft downstream of the existing bridges. The existing Poker Bar bridges are two steel, single span bridges over the split channel. Vertical concrete abutments underneath the left bridge contract the flow to a bridge opening width of 37 ft. The maximum width of the left bridge opening is about 82 ft (Appendix Figure A-11). A total discharge of 11,750 ft^3/s, 4,028 ft^3/s in the left channel and 7,722 ft^3/s in the right channel, will pass beneath the low chord of each existing bridge. Approximately 11,700 ft^3/s total discharge 4,013 ft^3/s in the left channel and 7,687 ft^3/s in the right channel (11,700 ft^3/s total discharge) is required to overtop the lowest point in the road profile over the island between the two bridges. Model results are shown in Table 18 for the 100-year flow (Table 3) at each cross section modeled at the Poker Bar site. Split flow was computed at cross sections 102.34 through 102.39. The left channel properties are reported for those cross sections in Tables 18 and 21.

Table 18. Hydraulic model results for 100-year flood flow (w/ROD - annual) Poker Bar left channel, No Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
102.39	23,400	1711.9	1732.3	8.1
102.38	23,400	1708.8	1731.9	9.1
102.375	Mult Open	Mult Open	Mult Open	Mult Open
102.37	23,400	1709.0	1728.9	14.8
102.34	23,400	1713.0	1729.2	9.9
102.05	23,400	1709.1	1726.9	8.9
101.83	23,400	1705.8	1722.9	11.7
101.71	23,400	1704.7	1721.0	8.9
101.57	23,400	1697.7	1715.0	14.2
101.39	23,400	1704.2	1714.3	8.9

The flow split between the two bridges was modeled using the **Multiple Opening Analysis** option in HEC-RAS. Tables 19 and 20 show the results of the multiple opening analysis at each bridge for all flows modeled.

Table 19. Hydraulic model results at existing left Poker Bar Bridge for all hydrology, No Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,200	4,037	114	1727.4	6.6
12,400	4,066	149	1727.5	6.7
15,000	5,953	1,500	1728.5	9.8
16,400	6,174	1,910	1728.6	10.1
17,000	6,266	2,090	1728.7	10.3
18,500	6,423	2,562	1728.7	10.5
23,400	5,268	4,771	1731.4	9.4

For a total discharge of 23,400 ft^3/s, a combination of weir flow and pressure flow occur at the left bridge. Submergence of the jet flow through the bridge opening and weir flow over the bridge deck probably occurs downstream. This complicated three-dimensional flow problem is beyond the scope and capability of the one-dimensional hydraulic model. However, the results of the hydraulic model are reasonable for use in the hydraulic, scour, and riprap sizing analyses.

At a certain discharge between 18,500 and 23,400 ft^3/s, the pressure required to push flow under the left bridge rises enough that it becomes easier to push flow over the bridge deck. Increased weir flow, decreased pressure flow, and submerged flow downstream cause a reduction in the flow velocity through the bridge opening for 23,400 ft^3/s. The water surface upstream of the bridge also rises, providing sufficient head to drive the weir flow.

Table 20. Hydraulic model results at existing right Poker Bar Bridge for all hydrology, No Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,200	8,049	0	1725.5	14.3
12,400	8,185	0	1725.6	14.3
15,000	7,122	425	1729.5	8.8
16,400	7,622	693	1729.7	9.4
17,000	7,808	836	1729.8	9.6
18,500	8,274	1,240	1730.1	10.2
23,400	9,775	3,587	1731.5	12.0

The right bridge opening is about 45 ft wider than the left bridge opening. The wider right bridge opening relieves some of the pressure flow underneath the bridge and submerged weir flow does not occur downstream.

Computed water surface elevations for the January 1, 1997 flood (15,000 ft^3/s) corresponded well with eyewitness accounts. The model shows the island upstream and downstream of the bridges, the road between the bridges, and part of the left bridge deck being overtopped during the 1997 flood. More detailed hydraulic summary tables for both bridges and the upstream and downstream river channels are included in the appendix for all flows and alternatives modeled (Tables A-11 - A14).

3.5.2. Proposed Action Alternative

At the Poker Bar site, the proposed action includes the construction of two separate steel truss bridges, 110 ft opening and 80 ft opening for left and right bridges respectively, immediately upstream (approximately 30 ft) of the existing bridges. The decks of the proposed bridges would be set to pass at least 23,400 ft^3/s (with ROD release - annual hydrology, 100-year flow, Table 3) beneath the low chord (Appendix Figure A-12). The road profile above the island between the proposed bridges would also be raised. The existing abutments would eventually be removed completely to accommodate higher flows. Table 21 summarizes the computed hydraulic properties at model cross sections throughout the Poker Bar reach.

Table 21. Hydraulic model results for 100-year flood flow (w/ROD - annual) Poker Bar left channel, Proposed Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Channel Velocity (ft/s)
102.61	23,400	1714.67	1731.6	13.3
102.39	23,400	1711.9	1731.0	9.8
102.387	23,400	1711.12	1730.7	9.8
102.384	Mult Open	Mult Open	Mult Open	Mult Open
102.38	23,400	1708.8	1729.6	8.0
102.37	23,400	1709.0	1727.6	9.8
102.34	23,400	1713.0	1729.1	10.0
102.05	23,400	1709.1	1726.6	9.2
101.83	23,400	1705.8	1722.9	11.7
101.71	23,400	1704.7	1721.0	8.9
101.57	23,400	1697.7	1715.0	14.2
101.39	23,400	1704.2	1714.3	8.9

Comparison of Tables 18 and 21 indicate that the proposed action may lower the water surface elevations upstream of the bridge by more than 1 ft for 23,400 ft^3/s. The lower water surface elevation is due to widening the bridge openings and raising the bridge decks above the water surface elevation for the proposed action. The existing bridge abutments constrict the flow and existing bridge decks impede the 23,400 ft^3/s flow, causing water to back up behind the bridges.

Computed hydraulic properties at the individual proposed bridges are summarized in Tables 22 and 23.

Table 22. Hydraulic model results at left Poker Bar Bridge for all hydrology Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,200	6,640	0	1726.3	7.4
12,400	6,751	0	1726.4	7.4
15,000	8,209	0	1727.4	8.3
16,400	8,997	0	1727.9	8.7
17,000	9,334	0	1728.0	8.9
18,500	10,182	0	1728.6	9.3
23,400	12,961	0	1730.0	10.4

Table 23. Hydraulic model results at right Poker Bar Bridge for all hydrology Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,200	5,560	0	1726.7	8.0
12,400	5,649	0	1726.8	8.1
15,000	6,791	0	1727.9	8.7
16,400	7,403	0	1728.5	9.0
17,000	7,666	0	1728.7	9.2
18,500	8,318	0	1729.3	9.4
23,400	10,439	0	1731.0	10.4

The proposed bridges do not experience pressure flow for any of the discharges modeled. This allows for free surface flow under the bridge and prevents flow from backing up behind the bridges and inundating the decks or adjacent road embankments for all flows modeled. Lower water surface elevations at the proposed bridge result in lower water surface elevations upstream and reduce the inundation potential of flood flows compared to the No Action Alternative.

Due to increased flows through the left bridge opening compared to the existing left bridge (Tables 19 and 22), flow velocities under the proposed left bridge increase slightly for some of the total discharges modeled. This may cause a slight increase in the sediment transport capacity at the left bridge, but it lowers the water surface immediately upstream by more than 1 ft for most flows.

The proposed right bridge experiences slower velocities than the existing right bridge for all total discharges modeled (Tables 20 and 23). The slower velocities are due to the elimination of pressure flow and the overall widening of the right bridge opening for the Proposed Action Alternative.

For total discharges 12,200 and 12,400 ft^3/s, water surface elevations upstream of the proposed right bridge than the existing right bridge. For these flows, the existing right bridge forces all of the flow through the bridge opening as pressure flow. The contraction and pressure flow through the bridge opening results in a water surface drawdown immediately upstream of the bridge. The lower water surfaces at the existing bridge cause average flow velocities through the opening to rise above 14 ft/s (Table 20), increasing the scour potential of 12,200 and 12,400 ft^3/s flows.

Modeled flows greater than 12,400 ft^3/s (total discharge) begin to overtop the existing right bridge deck. The weir flow over the existing deck backs up water upstream of the bridge resulting in higher water surfaces upstream of the existing right bridge compared to the proposed right bridge for the same flows.

3.5.3. Alternative 1

Poker Bar Alternative 1 consists of constructing two single span steel truss bridges, identical to those in the proposed alternative, but downstream (within 30 ft) of the existing bridges (Appendix Figure A-13). Due to the similarity of the bridge geometry and their close proximity to the proposed upstream bridges, the hydraulic properties for Alternative 1 were assumed to be equal to those computed for the Proposed Action Alternative for all of the same flows. No hydraulic model was created for this alternative.

3.6. Treadwell/Bigger's Road Site

The Treadwell site is the most downstream site of the four reported here. This site is on a straight reach of the Trinity River with no significant flow division even at low flows. Three alternatives (No Action, Proposed Action, and Alternative 1) were modeled in this reach using seven different flows (Table 4).

3.6.1. No Action Alternative

The existing Treadwell Bridge is a four span steel and wood deck with concrete piers and abutments (Appendix Figure A-14). The bridge is built in a small clearing on a relatively straight reach of the Trinity River. The bridge opening is approximately 200 ft between abutments and causes little flow contraction at higher flows. The existing Treadwell Bridge can pass about 9,000 ft^3/s under the

low chord and nearly 11,600 ft^3/s is required to flow over the deck at its lowest point. Hydraulic model results for the reach surrounding the existing bridge are presented in Table 24 for the 100-year flow (Table 4).

Table 24. Hydraulic model results for 100-year flood flow (w/ROD - annual) Treadwell, No Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
97.37	24,700	1649.62	1669.4	9.3
97.35	24,700	1648.21	1669.0	9.8
97.345	Bridge	Bridge	Bridge	Bridge
97.34	24,700	1648.15	1668.4	10.4
97.25	24,700	1648.59	1667.4	9.7
97.03	24,700	1646.68	1665.4	8.4
96.91	24,700	1644.47	1664.4	8.0
96.7	24,700	1640.95	1663.0	8.4
96.44	24,700	1640.39	1660.4	9.3
96.3	24,700	1638.02	1659.1	10.4

Table 25 shows hydraulic properties at the existing Treadwell Bridge for all flows modeled.

Table 25. Hydraulic model results at existing Treadwell Bridge for all hydrology No Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,300	12,216	84	1663.8	8.0
12,500	12,366	134	1664.0	8.1
15,000	13,539	1,461	1665.4	8.9
16,600	13,919	2,681	1666.2	9.1
17,200	14,014	3,186	1666.4	9.2
19,100	14,221	4,879	1667.2	9.3
24,700	13,916	10,784	1669.0	9.1

Computed water surface elevations for the January 1, 1997 flood (15,000 ft^3/s) matched closely with eyewitness accounts of what actually occurred during this event. Witnesses recalled water flowing over the top of the bridge deck by 1 to 3 ft and floating debris catching in the wooden guardrails. Hydraulic model calculations at 15,000 ft^3/s showed the flow overtopping the bridge deck by approximately 1.5 ft at its deepest point.

3.6.2. Proposed Action Alternative

At Treadwell Bridge, the proposed action is to construct a new steel truss bridge 137 ft upstream of the existing bridge. The proposed bridge would consist of two spans with a total opening of 230 ft and would be designed for overtopping during flood events (Appendix Figure A-15). The vertical deck profile for the new bridge would be determined by the elevation of Steel Bridge Road on the east end and by Bigger's Road on the west end. The existing deck, piers, and abutments would eventually be completely removed to accommodate flood flows without creating backwater effects upstream to the proposed bridge. Table 26 is a summary of the results of the HEC-RAS modeling at several cross sections in the proposed Bigger's Road Bridge reach for the 100-year flow (Table 4).

Table 26. Hydraulic model results for 100-year flood flow (w/ROD - annual) Treadwell/Bigger's Road, Proposed Action Alternative

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
97.56	24,700	1652.08	1671.1	8.3
97.38	24,700	1649.62	1669.2	9.4
97.375	Bridge	Bridge	Bridge	Bridge
97.37	24,700	1649.62	1668.7	9.8
97.35	24,700	1648.21	1668.3	10.0
97.34	24,700	1648.15	1668.3	10.1
97.25	24,700	1648.59	1667.3	9.8
97.03	24,700	1646.68	1665.2	8.6
96.91	24,700	1644.47	1664.2	8.2
96.7	24,700	1640.95	1662.7	8.6
96.44	24,700	1640.39	1660.4	9.3
96.3	24,700	1638.02	1659.1	10.4

Compared to computed values for the existing bridge (Table 24), Table 26 shows the water surface elevations lowering slightly for the proposed action at 24,700 ft^3/s. Due to the small decrease in flow area, the proposed action causes average channel flow velocities to increase slightly in the reach.

Investigations of the hydraulic properties of the proposed steel truss bridge indicate that it would overtop at approximately 15,000 ft^3/s (estimated January 1, 1997 flood flow). Table 27 displays modeling results at the proposed bridge for all flows.

Table 27. Hydraulic model results at Treadwell/Bigger's Road Bridge for all hydrology, Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Velocity Through Bridge Opening (ft/s)
12,300	12,300	0	1663.3	6.4
12,500	12,500	0	1663.4	6.5
15,000	14,994	6	1664.7	6.9
16,600	16,538	62	1665.4	7.2
17,200	17,092	108	1665.7	7.3
19,100	17,548	1,552	1668.3	7.2
24,700	21,093	3,607	1669.2	8.6

The average bridge opening velocities beneath the proposed bridge are lower than the velocities below the existing bridge (Table 25). Lower flow velocities help minimize erosion potential in the vicinity of the bridge. The higher deck elevations and wider bridge opening contribute to the reduction in flow velocities at the proposed Treadwell/Bigger's Road Bridge.

3.6.3. Alternative 1

The final alternative (Appendix Figure A-16) examined in detail at the Treadwell site consisted of a two span, 230-ft long steel truss bridge located 137 ft upstream of the existing bridge, just as in the Proposed Action Alternative. However, the Alternative 1 bridge deck elevation would be raised to accommodate the with ROD release – annual hydrology, 50-year and 100-year flows (Q_{50} = 19,100 ft^3/s and Q_{100} = 24,700 ft^3/s; Table 4). The deck would be raised to pass the Q_{50} + 2.0 ft of freeboard and the Q_{100} without impacting the low chord. Results of Alternative 1 hydraulic computations are presented in Table 28 for Q_{100}.

Table 28. Hydraulic model results for 100-year flood flow (w/ROD - annual) Treadwell/Bigger's Road, Alternative 1

Cross Section (RM)	Discharge (ft^3/s)	Thalweg Elevation (ft)	Water Surface Elevation (ft)	Average Velocity in Channel (ft/s)
97.56	24,700	1652.08	1670.8	8.5
97.38	24,700	1649.62	1668.8	9.7
97.375	Bridge	Bridge	Bridge	Bridge
97.37	24,700	1649.62	1668.7	9.8
97.35	24,700	1648.21	1668.3	10.0
97.34	24,700	1648.15	1668.3	10.1
97.25	24,700	1648.59	1667.3	9.8
97.03	24,700	1646.68	1665.2	8.6
96.91	24,700	1644.47	1664.2	8.2
96.7	24,700	1640.95	1662.7	8.6
96.44	24,700	1640.39	1660.4	9.3
96.3	24,700	1638.02	1659.1	10.4

Raising the deck out of the flow for 24,700 ft^3/s lowers the water surface elevation upstream of the bridge compared to the Proposed Action Alternative (Table 26). The lower water surface decreases the cross sectional flow area, resulting in higher average channel flow velocities upstream of the Alternative 1 bridge. Hydraulic properties at the Alternative 1 bridge for all seven flows modeled are shown in Table 29.

Table 29. Hydraulic model results at Treadwell/Bigger's Road Bridge for all hydrology, Proposed Action Alternative

Total Discharge (ft^3/s)	Discharge Under Bridge (ft^3/s)	Discharge Over Bridge/Weir (ft^3/s)	WSEL at Upstream Face of Bridge (ft)	Avg. Bridge Opening Velocity (ft/s)
12,300	12,300	0	1663.3	6.4
12,500	12,500	0	1663.4	6.5
15,000	15,000	0	1664.7	6.9
16,600	16,600	0	1665.4	7.2
17,200	17,200	0	1665.7	7.3
19,100	19,100	0	1666.5	7.6
24,700	24,700	0	1668.8	8.1

As designed, none of the modeled flows overtop the deck or encroach on the low chord of the Alternative 1 Treadwell/Bigger's Road Bridge. Under Alternative 1 conditions, water surface elevations immediately upstream of the bridge are lower than the Proposed Action Alternative, reducing potential flooding impacts. However, flow velocities rise, increasing potential scour impacts. Downstream of the Alternative 1 bridge, computed hydraulic properties are identical to those for the Proposed Action Alternative.

4. SCOUR ANALYSIS

Scour estimates were computed at each of the four bridge sites for each of the alternatives discussed in the hydraulic analysis. Results of the hydraulic analysis were used to create input files for the **Hydraulic Design Functions** module of HEC-RAS. The **Scour at Bridges** function of this module uses hydraulic parameters from the steady or unsteady flow analysis and water temperature and bed material gradation information input by the user to perform scour computations based on the methods outlined in Hydraulic Engineering Circular No. 18 (FHWA, 1995). Three types of bridge scour estimates can be computed in HEC-RAS: contraction scour, pier scour, and abutment scour. The contraction scour in the channel bed is combined with the local pier or abutment scour to produce a total scour estimate.

4.1. Assumptions

The existing armor layer was assumed to be transported by the scour flows analyzed. During the initial stages of the flood event, the armor layer would be removed, exposing the finer graded bed material in the substrate layer. The finer substrate material is more easily transported by the flood flows, resulting in high erosion rates and conservative bridge scour estimates.

The Bureau of Reclamation published a geology report in November of 2001 characterizing the existing sediment layers at each bridge site (Sherer, 2001). The report describes the overall geology at each location, gives detailed logs of drill holes, and presents information about bed material samples that were collected in the vicinity of the bridges. The geological data presented in that report indicates that a continuous layer of erosion resistant material, either bedrock or conglomerate, exists below the channel bed at all four of the bridge sites. The conglomerate was assumed to be highly resistant to erosion, therefore controlling scour depths at each bridge if reached.

It was assumed that all alternative bridges would be founded on bedrock or competent, erosion resistant rock. Abutments and piers founded on continuous hard layers would have the best chance of surviving a large magnitude flood event. The scour estimates were controlled by the elevation of the bedrock or hard conglomerate layer in most cases. Bridges founded on the controlling hard layer would prevent undermining of critical support members due to scour.

Bed material bulk samples (armor and substrate layers) were collected at the Salt Flat and Poker Bar sites in 2001. The general bed material gradations at the Bucktail and Treadwell/Bigger's Road sites were assumed from Salt Flat and

Poker Bar samples based on location and hydraulic characteristics. The bed material data was used as input data for bridge scour computations.

The HEC No. 18 manual suggests checking scour for three separate flows: the 100-year flood flow, the bridge or adjacent embankment overtopping flow, and the estimated 500-year or superflood (FHWA, 1995). The 100-year flood flow estimate for the with ROD release - annual hydrology scenario (Q_{100}; Tables 1-4) was used to evaluate scour at each of the four sites for each alternative examined. The results of the hydraulic computations for the Q_{100} were compared to the computed hydraulic properties for the bridge overtopping flow at each bridge site for each alternative. When the overtopping flow was less than the Q_{100}, the Q_{100} was determined to be the critical flow due to its greater depth and higher velocity. None of the Proposed Action or Alternative 1 bridges were designed for flows greater than the 100-year flow, so when the overtopping flow was greater than the Q_{100}, that flow was disregarded for scour computations. The estimated 500-year flood flow was not used for scour computations for the same reason. The use of the Q_{100} for scour estimates at all four sites provided a common basis for comparison between sites and alternatives.

Different alternatives that had similar hydraulic properties for the same total discharge at a particular site were assumed to have the same scour potential. The scour depths and elevations computed for one of the alternatives were assumed to apply to each alternative at that site with similar hydraulic properties.

These assumptions were made at each site for each alternative analyzed. All the assumptions significantly influence the magnitude of the estimated scour depths at all four bridge sites for each alternative. Scour estimates were made at each bridge site for No Action, Proposed Action, and Alternative 1 alternatives.

4.2. Cross Section Surveys

As an initial assessment of scour potential at each site, cross section surveys from different time periods were compared to determine if the January 1, 1997 flood event had any lasting effects on Trinity River channel geometry downstream of Lewiston Dam or to identify any long term channel degradational or aggradational patterns. The California Department of Water Resources collected cross section survey data in the Trinity River from Lewiston Dam downstream to the Trinity River North Fork confluence a few years prior to the January 1, 1997 flood. Cross section data in the vicinity of the Trinity River bridges was collected again during the 1999 to 2001 time period.

Comparison of the pre-1997 and post-1997 cross section profile plots indicated that no significant long-term channel degradation resulted from the January 1, 1997 flood. The 1997 flood flows were estimated to be 15,000 ft^3/s at Treadwell and Poker Bar bridges and 11,000 ft^3/s at Bucktail and Salt Flat bridges (McBain, 2002). Short term localized scour may have occurred during this event, but was not sufficient to fail any of the existing bridge structures. Any scour holes that may have developed at or near the bridges during the 1997 flood were quickly filled in by sediment deposits from the upstream bed.

4.3. Salt Flat Site

Scour estimates for the existing and two alternative bridge configurations were computed at the Salt Flat site on the main stem of the Trinity River five miles downstream of Lewiston Dam. Scour due to flow contraction, pier scour, and abutment toe scour were included in the calculations. For all computations, it was assumed that the larger diameter bed material in the armor layer was removed by high flows at the bridge site exposing the substrate bed material to flood flows, thus increasing scour potential. Scour computations were performed at the existing and proposed Salt Flat bridges for the 100-year flood flow estimate (Table 1).

4.3.1. No Action Alternative

At the existing Salt Flat Bridge, computed scour depths for a 12,900 ft^3/s discharge were 12.2 ft (El. 1765 ft[4]) at the left abutment toe, 9.9 ft (El. 1756 ft) at the base of the pier in the main channel, and 9.8 ft (El. 1759 ft) at the toe of the right abutment. Geologic data at Salt Flat Bridge suggest that granite bedrock exists across the entire cross section at depths ranging from 0.5 to 30 ft below the exposed ground surface. Near the left abutment, drill logs estimate 12 to 14 ft of fill and alluvial material on top of the continuous granite surface resulting in an approximate bedrock elevation of 1764 ft. Depth of alluvium in the channels underneath the bridge varies between about 6 ft in the low flow fish habitat channel (left of the main channel) to less than 1 ft in the main channel bed. Beneath the existing pier in the main channel, the elevation of competent bedrock is estimated to be about 1763 ft. Depth to bedrock near the right abutment is estimated between 20 and 30 ft (estimated bedrock elevation 1751 ft).

The granite bedrock would likely control the scour depth at the pier near the center of the main channel. Scour at the left abutment would either be controlled by existing bedrock or would stop just above it. At the right abutment, scour

[4] Elevations of bottom of scour holes based on elevations of abutment toes and pier bases at existing ground level taken from preliminary design drawings. Actual scour hole bottom elevations will depend on as-built elevations.

would probably cease before the elevation of the bedrock layer was reached for a flow of 12,900 ft^3/s.

The presence of shallow bedrock and a large, flat, low left overbank area in the vicinity of the bridge would partially counteract the tendency of the river to scour during high flow events. The bridge abutments may be vulnerable to scour, but the channel bed would be protected by shallow granite bedrock. The piers under the bridge may be founded on bedrock, but their depth is unknown.

4.3.2. Proposed Action Alternative

The maximum scour depth and lowest scour elevation for the proposed bridge (280 ft bridge opening with single 4 ft diameter cylindrical pier) occurs at the pier base. For 12,900 ft^3/s, the calculated depth of scour at the base of the pier of the proposed bridge was 8.3 ft, resulting in an elevation of 1764 ft at the bottom of the scour hole. At the toe of the right abutment, the computed scour depth for 12,900 ft^3/s was 6.6 ft, resulting in a scour hole bottom elevation of 1769 ft. The water surface never reached the left abutment for the proposed bridge so zero local scour was estimated there.

According to estimates from USBR geologists based on drill holes at the Salt Flat Bridge site, the elevations of a continuous competent rock layer that the proposed bridge structure will be anchored to are approximately 1755, 1763, and 1750 ft at the proposed left abutment, pier, and right abutment respectively. These elevations are at or below the bottom of the potential scour holes for the proposed bridge. This means that the computed bridge scour would not likely be controlled by the existing competent granite layer but rather by the thickness and grain size distribution of the overlying bed material. Abutment and pier foundations driven into the competent rock layer would provide a factor of safety against structural undermining and erosion that might occur during future flood events.

4.3.3. Alternative 1

Due to the similarity between the bridge geometry for the two alternatives, scour estimates for the Proposed Action Alternative were assumed to apply to Alternative 1. Similar bridge geometry and close proximity would result in nearly identical hydraulic properties for a 12,900 ft^3/s discharge, thus producing almost identical scour estimates. The scour depths at the Alternative 1 bridge would likely be controlled by the same factors identified for the Proposed Action Alternative.

4.4. Bucktail Site

CH2M Hill drill holes and Bureau of Reclamation drill holes logged at Bucktail Bridge (Sherer, 2001) estimate 20 ft at the left abutment and 22 ft at the right abutment of fill and coarse alluvium above a dense, coarse, very hard layer of conglomerate sediments. This conglomerate layer is well cemented by sand and clay fines and would be extremely resistant to erosion, even at high flows if exposed. In the main channel, minimal overlying alluvium is thought to exist (0 - 2 ft) above the conglomerate.

The potential scour at the Bucktail Bridge site is limited by several geologic and geometric properties. The existing erosion resistant materials under the channel bed surface limit the vertical change in bed elevation. The rock outcrop in the left bank and main channel downstream of the bridge reduces flow velocities and sediment transport capabilities of flood flows. The high flow channel with culvert diverts a portion of the flood flows away from the bridge, resulting in less flow and lower velocities there. These features combine to reduce the impacts of flood flows on erosion rates at the Bucktail Bridge site.

Under Proposed Action Alternative and Alternative 1 conditions, the existing Bucktail Bridge geometry or structure would not be modified. Therefore, as-built Bucktail Bridge geometry was used in all hydraulic and scour computations. The geology described above would apply to all scour computations for the No Action and Proposed Action Alternatives and Alternative 1.

For the with ROD release – annual hydrology scenario estimated 100-year flood flow of 13,100 ft^3/s (Table 2), the flow split between the existing bridge and the culvert channel was similar for all alternatives (refer to Tables 10-11, 13-14, 16-17 in the "Hydraulic Analysis" section of this report). Due to the similarity of computed hydraulics at the bridge for the three alternatives, the output from the Proposed Action Alternative hydraulic model was used to estimate the bridge scour for each alternative.

4.4.1. No Action Alternative

The computed bridge scour estimates for the Proposed Action Alternative for 13,100 ft^3/s apply to the No Action Alternative and Alternative 1 as well.

4.4.2. Proposed Action Alternative

At the Bucktail site, the existing bridge geometry with the proposed low arch culvert to the west and the road over the culvert set at El. 1760.5 ft was used. The

estimated 100-year with ROD-Annual flow at the Bucktail site is 13,100 ft^3/s (Table 2). Hydraulic computations for this flow determined that approximately 13,012 ft^3/s passed under the bridge while the remaining 88 ft^3/s passed through the culvert (Tables 13 and 14). Scour computations were performed only at the bridge, not at the culvert. Scour at the culvert would be insignificant for the 100-year flood due to relatively low flow velocities through the culvert (approximately 3.2 ft/s). No substrate grain size data existed at this site, so the mean diameter (d_{50}) of the channel bed material was estimated from substrate samples collected at Salt Flat and Poker Bar.

Contraction and abutment scour were estimated at the bridge. The lowest bottom of scour hole elevation (approximately 1738 ft) occurs at about the center of the channel due to an estimated contraction scour depth of 2.0 ft. The depth of scour was computed as 7.7 ft at the left abutment and 6.2 ft at the right abutment. This resulted in bottom of scour hole elevations of 1741 ft at the left abutment and 1742 ft at the right abutment.

According to the USBR geology report (Sherer 2001) and CH2M-Hill drill logs, a continuous hard conglomerate layer exists at about El. 1742.5 ft in the vicinity of the left abutment. In the main channel, the elevation of this hard conglomerate layer is estimated to be El. 1738.5 ft. The hard conglomerate layer elevation at the right abutment is approximately 1740.5 ft. The hard conglomerate layer described is highly resistant to erosion, preventing scour below its surface.

Comparing the approximate hard conglomerate layer elevations to the estimated scour hole bottom elevations indicates that the scour depth at the left abutment and in the main channel would likely be controlled by the erosion resistant layer. At the right abutment, scour might stop just above the elevation of the hard conglomerate layer for the 100-year flood flow.

4.4.3. Alternative 1

The computed bridge scour estimates for the Proposed Action Alternative for 13,100 ft^3/s apply to the No Action Alternative and Alternative 1 as well.

4.5. Poker Bar Site

At the Poker Bar site, existing and modified alternative bridges consist of single span structures without piers. Contraction and abutment scour were estimated at each bridge site for the No Action and Proposed Action Alternatives. A total discharge of 23,400 ft^3/s (Table 3; Q_{100}) was used for all scour computations.

4.5.1. No Action Alternative

At Poker Bar, drill holes revealed loosely bonded coarse alluvial material overlying a more compacted and hard conglomerate layer. The weakly cemented but erosion resistant conglomerate layer consists of coarse material (boulders, cobbles, and gravel) with finer sands and clays filling the interstitial spaces. This material is difficult to penetrate and would undoubtedly decrease if not halt erosion once the overlying alluvium was removed. This conglomerate layer was discovered at all four Poker Bar drill holes sites and appears to be continuous across the entire cross section of the bridges.

Conglomerate was apparent from the ground surface to the bottom of the drill hole near the left abutment of the left bridge (looking downstream). The estimated elevation of the conglomerate at the left abutment toe is 1712 ft. The right abutment of the left bridge has about 22 ft of fill and loose alluvium above the harder conglomerate layer at elevation 1707 ft. In the channel, the geologic information indicates 1 to 2 ft of alluvium overlying conglomerate (Sherer, 2001) resulting in an erosion resistant layer at about El. 1707.5 ft.

The right bridge has approximately 27 ft of fill material and loose alluvium above the conglomerate layer at the left abutment and about 22 ft at the right abutment (Sherer, 2001). The estimated elevations of the conglomerate layer at the right bridge are 1701 ft and 1707 ft at the left and right abutments respectively. Alluvial material is an average of 10 ft deep above conglomerate in the channel bed under the right bridge resulting in a conglomerate layer elevation of approximately 1704 below the right channel thalweg.

Scour at both bridges was analyzed for a total discharge of 23,400 ft^3/s to determine where the maximum scour depth might occur. For a 23,400 ft^3/s total discharge, 10,039 ft^3/s travels down the left channel while the remaining 13,361 ft^3/s splits into the right channel (Tables 19 and 20 in "Hydraulic Analysis" section). Hydraulic analysis determined that even though more flow goes down the right channel, the vertical concrete abutments severely contract the flow in the left channel, increasing flow velocity and creating large potential scour depths at the abutment toes.

At the left bridge, potential total scour depths of 29.7 ft, 1.7 ft, and 31.2 ft were computed at the left abutment, thalweg, and right abutments corresponding to bottom of scour hole elevations of 1682 ft, 1707 ft, and 1680 ft respectively. These estimated scour elevations are well below the approximate conglomerate layer elevations at the existing left bridge. Scour depths would be controlled by the erosion resistant conglomerate layer beneath the left bridge.

At the existing right bridge, estimated scour depths of 7.3 ft and 13.7 ft were computed at the left and right abutments respectively. Contraction scour was estimated to be zero in the main channel under the right bridge. Bottom of scour hole elevations are 1720 ft at the left abutment and 1713 ft at the right abutment. The bottoms of these scour holes are above the existing conglomerate layer, indicating that scour depth would likely cease before reaching the erosion resistant material.

Due to the large depth of erodible sediment above the conglomerate layer, the bridge abutments and the bed under the right bridge have the highest potential for scour during a flood event. The bed below the left bridge has shallow alluvium overlying hard conglomerate that would impede erosion. The island between the bridges consists of alluvial deposits, but the established vegetation would provide significant resistance to erosion during high flow events.

4.5.2. Proposed Action Alternative

Geometry for two new steel bridges at Poker Bar, 30 ft upstream of the existing bridges was used for proposed action scour computations. For a 100-year flow of 23,400 ft^3/s (Table 3), hydraulic computations showed 12,961 ft^3/s traveling down the left channel and the remaining 10,439 ft^3/s passing down the right channel (Tables 22 and 23). Because of the uneven flow split and higher resulting depths and velocities, the left channel was determined to be the most critical for scour computations. The substrate d_{50} was computed from bed material samples collected at the site.

Contraction and abutment scour were computed at the proposed left Poker Bar Bridge for 12,961 ft^3/s. The computed depths of scour were 9.3 ft, 1.0 ft, and 16.6 ft resulting in bottom of scour hole elevations of El. 1720, 1710, and 1708 ft at the left abutment, thalweg of main channel, and right abutments respectively. These numbers show that the largest scour depth and lowest scour hole bottom elevation occurs at the right abutment.

The 2001 BOR geologic report reveals that at the existing left Poker Bar Bridge, a continuous, erosion resistant, hard conglomerate layer exists underneath construction fill and alluvium. At the left abutment, channel thalweg, and right abutment, the approximate elevations of this hard conglomerate layer are El. 1712 ft, 1707.5 ft, and 1707 ft respectively. According to the comparison of these elevations to the estimated bottom of scour hole elevations, the hard conglomerate layer is too deep to control the depth of scour. During the 100 yr event, scour would likely cease before reaching the erosion resistant layer.

The safest and recommended method of new bridge construction would be to found all abutments on the hard conglomerate layer that is below the estimated depths of scour.

4.5.3. Alternative 1

Due to the similar bridge geometry and close proximity of the Proposed Action and Alternative 1 options, the computed hydraulics and scour estimates for a total discharge of 24,300 ft^3/s at the proposed action bridge apply to both alternatives.

4.6. Treadwell/Bigger's Road Site

The existing Treadwell Bridge and two alternative bridge configurations (Bigger's Road bridges) were evaluated for scour potential at this site. Geologic data, drill logs, bed material samples from similar reaches, and cross section surveys were used to perform the scour analysis. The 100-year flood (24,700 ft^3/s; Table 4) was assumed for each alternative scour analysis.

4.6.1. No Action Alternative

Geological data collected at the existing Treadwell Bridge indicates that all three piers are founded on bedrock (Sherer, 2001). The bedrock is continuous across the entire bridge cross section and is exposed in several places. Portions of the riverbed are covered with a sediment layer that averages less than 1 foot deep and consists of large gravel, cobbles, and boulders. There is a pocket of sediment deposits approximately 5 feet deep near the westernmost pier (furthest right), but it is confined to a small area and the pier is likely founded on the underlying bedrock. The abutments have about 10 feet of fill above the bedrock layer that could potentially be scoured during a flood event, but the abutments are also anchored to the existing bedrock. Essentially all overlying material (above bedrock) could be removed during a high flow event without significantly changing the cross section shape or undermining the existing Treadwell Bridge piers or abutments.

For evaluating scour at this site, it was assumed that all remaining bed material would be scoured from the bed and moved downstream during a 100-year flood event (24,700 ft^3/s). This situation represents the worst-case scenario that could potentially occur at Treadwell Bridge. The fact that all existing piers and abutments are founded on bedrock at Treadwell Bridge eliminates the need for scour depth computations for the No Action Alternative. The exposed or shallow continuous bedrock layer would control the scour across the entire cross section.

4.6.2. Proposed Action Alternative

Scour computations were performed for the proposed, overtopping, two span, steel truss Bigger's Road Bridge 137 ft upstream of the existing bridge. For 24,700 ft^3/s, the deepest scour hole occurs at the left abutment. Total scour at that location is 20.6 ft deep resulting in a bottom of scour hole elevation of approximately 1635 ft at the left abutment. The total scour depth at the single pier and right abutment is estimated at about 9.6 ft and 9.5 ft, producing bottom of scour hole elevations of 1646 ft and 1651 ft respectively.

Bureau of Reclamation drill crews determined the depth to bedrock at the proposed Bigger's Road Bridge site (Mongano, 2003). At the proposed right abutment, approximately 1 ft of alluvium covers existing bedrock. A drill log near the proposed pier location indicates a depth below the surface of about 5 ft to bedrock. Based on the drill logs, the resulting elevations of bedrock are about 1660 ft at the right abutment and about 1651 ft at the single pier. Visual observation and geologic field mapping at the proposed left abutment site identified exposed continuous bedrock from above the water surface elevation to a point approximately two-thirds of the way across the channel. Exposed bedrock elevation at the proposed left abutment is about elevation 1656 ft.

Each of the computed scour elevations are well below the estimated elevation of the existing bedrock at the proposed bridge location. Therefore, assuming the 100-year flood was capable of removing the armor layer, scour depth would be limited by the existing Abrams Schist (bedrock) layer across the entire channel.

4.6.3. Alternative 1

At 24,700 ft^3/s, the scour potential for the Alternative 1 Bigger's Road Bridge (deck elevation set above the 100-year flood) was estimated. The computed total scour depth at the pier was about 9.6 ft. The total scour depths at the left and right abutments were estimated as 18.7 ft and 7.8 ft respectively. The resulting bottom of scour hole elevations would be approximately 1637 ft at the left abutment, 1646 ft at the single pier, and 1653 ft at the right abutment.

The estimated scour depths are all below the bedrock at this site. The existing Abrams Schist layer would control the scour depth for the Alternative 1 Bigger's Road Bridge.

Any new bridge constructed at this site should be founded on bedrock. Abutments and piers should be able to withstand the removal of all overlying alluvium without compromising the structural integrity of the bridge. The

presence of shallow bedrock at this site makes founding the new bridge on the hard layer feasible.

5. RIPRAP SIZING

Riprap sizes ranges and general gradations required to protect proposed bridges against scour for the 100-year flood event (Tables 1-4; with ROD release - annual hydrology scenario) were computed at each of the four sites using CHANLPRO version 2.0. CHANLPRO is a US Army Corps of Engineers computer program for determining necessary riprap gradation for bank protection based on river channel hydraulic geometry input (Maynord, Hebler, Knight, 1998). Required riprap gradations were estimated for Proposed Action and Alternative 1 options at each of the four sites using output from the hydraulic models to create input files for CHANLPRO. Riprap sizes were not computed for the No Action Alternative at any of the bridge sites.

Output from CHANLPRO consists of recommended ETL gradations for design of channel protection. Summary tables of CHANLPRO output were created at each bridge site for each alternative (Tables 30 - 35) using the 100-year flood flow.

5.1. Salt Flat Site

The Trinity River bends to the left immediately downstream of the existing Salt Flat Bridge. The site was analyzed as a bendway reach to provide an additional factor of safety. The Proposed Action bridge was designed to be placed downstream of the existing bridge, placing it in the river bend. The riprap gradations in Table 30 apply to the Proposed Action and Alternative 1 due to the similar hydraulics of the two options for the estimated 100-year flood (12,900 ft^3/s; Table 1). Input parameters used are listed below the table.

Table 30. Riprap gradation for 12,900 ft^3/s at Salt Flat in bend
Proposed Action Alternative and Alternative 1

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	15.00	10.56	10.0	7.32	6.00
1.5H:1V	18.00	12.72	12.00	8.76	9.50

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Center Line Bend Radius, ft = 625.0
Water Surface Width, ft = 112.0
Local Flow Depth, ft = 9.7
Average Channel Velocity, ft/s = 7.2

As would be expected, smaller riprap sizes are recommended for the 2:1 side slope than the 1:1 side slope due to the greater stability of the flatter slope.

5.2. Bucktail Site

The existing Bucktail Bridge was analyzed as being in a straight reach for riprap design. Riprap was sized for the Proposed Action Alternative and Alternative 1 separately (Tables 31 and 32). The 100-year flood estimate at Bucktail is 13,100 ft^3/s (Table 2).

Table 31. Riprap gradation for 13,100 ft^3/s at Bucktail in straight reach
Proposed Action Alternative

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	33.00	23.28	22.00	16.08	17.50
1.5H:1V	42.00	29.64	28.00	20.40	22.20

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Local Flow Depth, ft = 11.2
Average Channel Velocity, ft/s = 14.7

Table 32. Riprap gradation for 13,100 ft^3/s at Bucktail in straight reach
Alternative 1

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	36.00	25.32	24.00	17.52	19.00
1.5H:1V	48.00	33.84	32.00	23.40	25.40

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Local Flow Depth, ft = 10.9
Average Channel Velocity, ft/s = 15.6

A high, steep bank in a sharp bend exists along the left side of the channel downstream of Bucktail Bridge. Riprap bank protection was sized for the eroding left bank in the bendway and is presented in Table 33 for 13,100 ft^3/s.

Table 33. Riprap gradation for 13,100 ft^3/s at Bucktail in bend
Proposed Action Alternative

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	36.00	25.32	24.00	17.52	19.00
1.5H:1V	48.00	33.84	32.00	23.40	25.40

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Center Line Bend Radius, ft = 245.0
Water Surface Width, ft = 95.3
Local Flow Depth, ft = 9.0
Average Channel Velocity, ft/s = 9.1

The feasibility of placing riprap along the left bank is unknown. Space restrictions may not allow grading of the banks and placement of riprap. The stability of the steep left bank should be evaluated. Limited cross section survey data downstream of the existing bridge showed no significant change in cross section geometry along the left bank from the January 1, 1997 flood event.

5.3. Poker Bar Site

Riprap sizing for the Proposed Action and Alternative 1 Poker Bar bridges was performed for a total discharge of 23,400 ft^3/s (Table 3) in a straight reach. Due to deeper flow and higher velocities, the proposed left bridge was chosen as the critical location for riprap sizing. The riprap gradations in Table 34 apply to both the Proposed Action Alternative and Alternative 1 due to the similarity in bridge geometry and proximity of the potential bridges.

Table 34. Riprap gradation for 23,400 ft^3/s at Poker Bar in straight reach
Proposed Action Alternative and Alternative 1

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	15.00	10.56	10.00	7.32	7.90
1.5H:1V	18.00	12.72	12.00	8.76	9.50

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Local Flow Depth, ft = 16.6
Average Channel Velocity, ft/s = 10.5

The same riprap gradations would be adequate for the right bridge for a total discharge of 23,400 ft^3/s. Using the same size protection may be more

economical as it would eliminate the need to purchase, transport, and place two separate gradations of riprap.

5.4. Treadwell/Bigger's Road Site

For riprap sizing, the Treadwell/Bigger's Road site was analyzed as a straight reach. Only the Proposed Action Alternative was evaluated for riprap because the flow depth and velocity at the proposed bridge were higher for the 100-year flood than at the Alternative 1 bridge. Table 35 outlines the recommended riprap gradation for the 100-year flood, 24,700 ft^3/s (Table 4), for both alternatives.

Table 35. Riprap gradation for 24,700 ft^3/s at Treadwell/Bigger's Road in straight reach, Proposed Action Alternative and Alternative 1

Side Slope H:V	Max D_{100} (in)	Min D_{90} (in)	Max D_{50} (in)	Min D_{30} (in)	Max D_{15} (in)
2.0H:1V	12.00	8.40	8.00	5.76	6.30
1.5H:1V	15.00	10.56	10.00	7.32	7.90

CHANLPRO Input Data:

Specific Weight of Stone, lb/ft^3 = 165.0
Local Flow Depth, ft = 14.0
Average Channel Velocity, ft/s = 9.6

The steeper side slope produces a larger required gradation. Table 35 gradations apply to both Treadwell/Bigger's Road alternative bridges (Proposed Action and Alternative 1).

6. REFERENCES

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7. APPENDIX

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7.1.1. Hydraulic Model Calibration Figures

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Treadwell hydraulic model calibration ..... Figure A-4

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Salt Flat Site: Alternative 1 ..... Figure A-7
Bucktail Site: No Action Alternative ..... Figure A-8
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Treadwell Site, Proposed Action Alt.: Bridge ..... Table A-18
Treadwell Site, Alternative 1: Reach ..... Table A-19
Treadwell Site, Alternative 1: Bridge ..... Table A-20

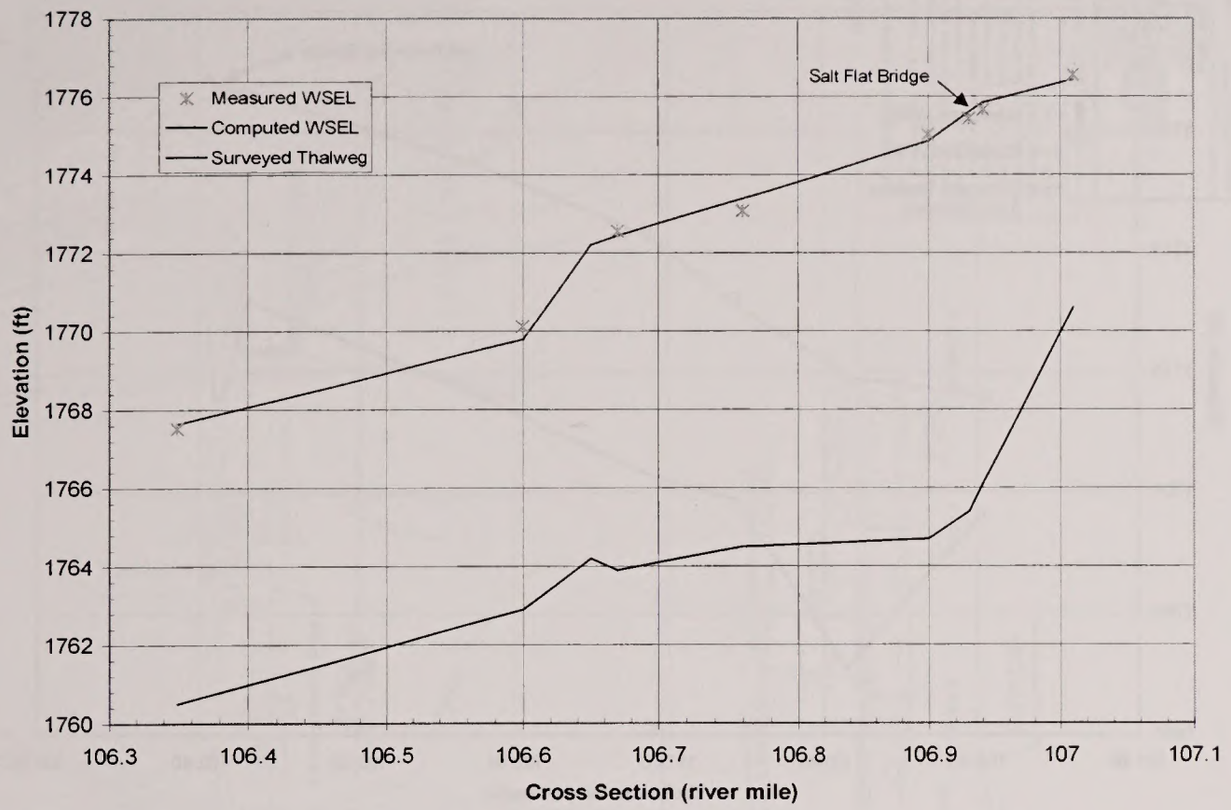


Figure A-1. Salt Flat Bridge hydraulic model calibration for 5,000 ft^3/s

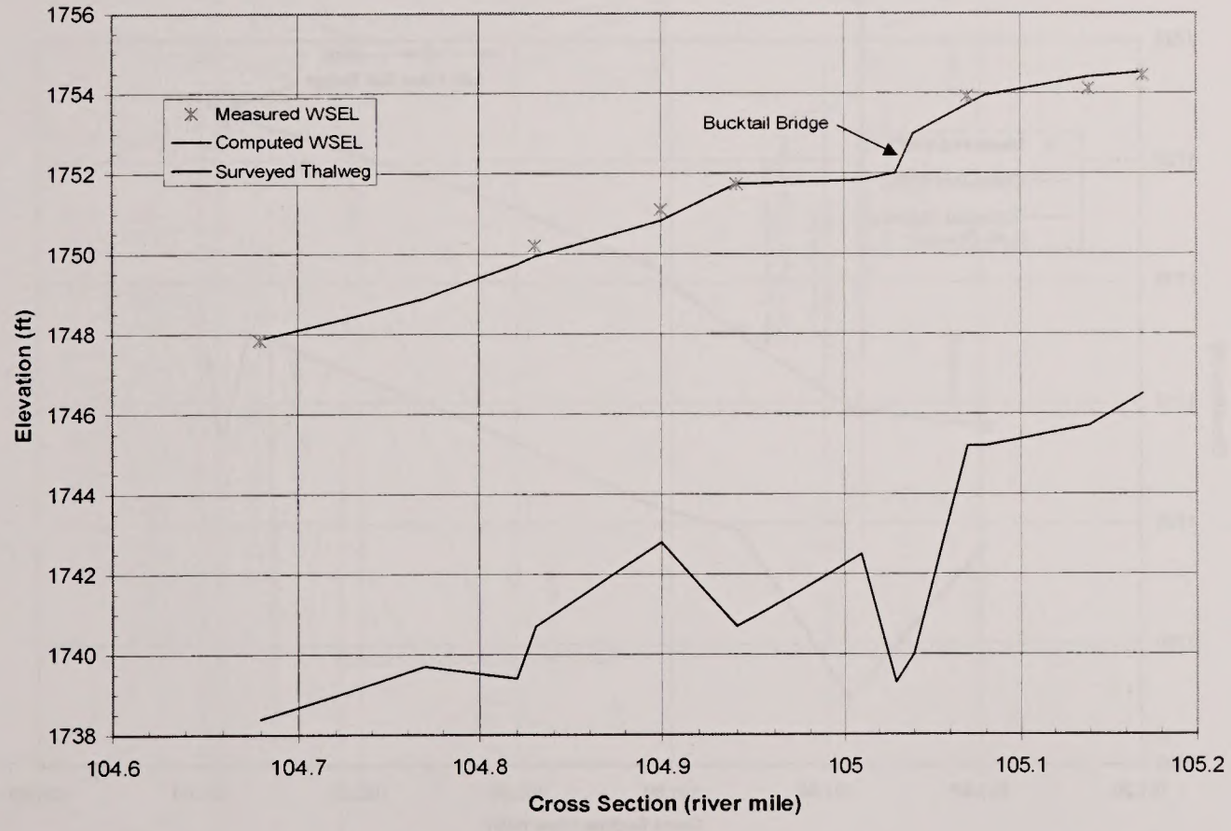


Figure A-2. Bucktail Bridge hydraulic model calibration for 5,000 ft^3/s

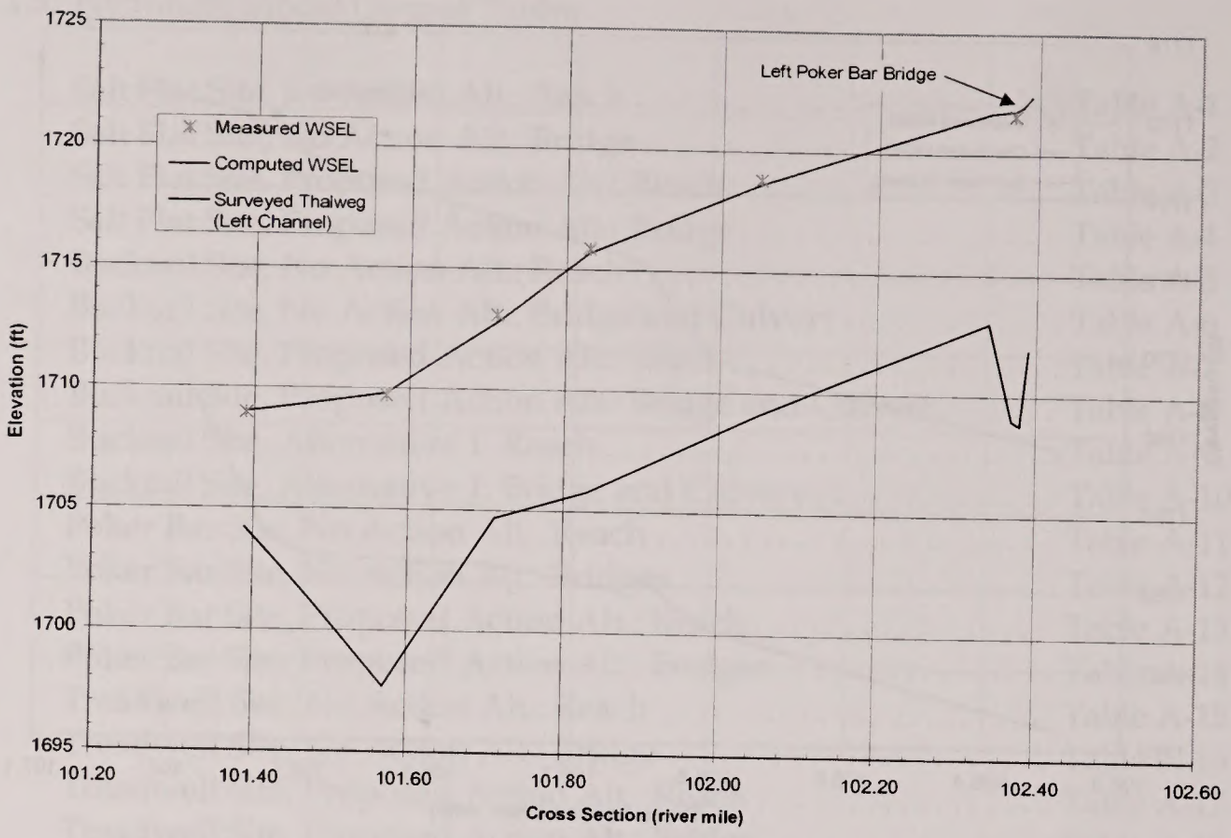


Figure A-3. Left Poker Bar Bridge hydraulic model calibration for 5,000 ft^3/s

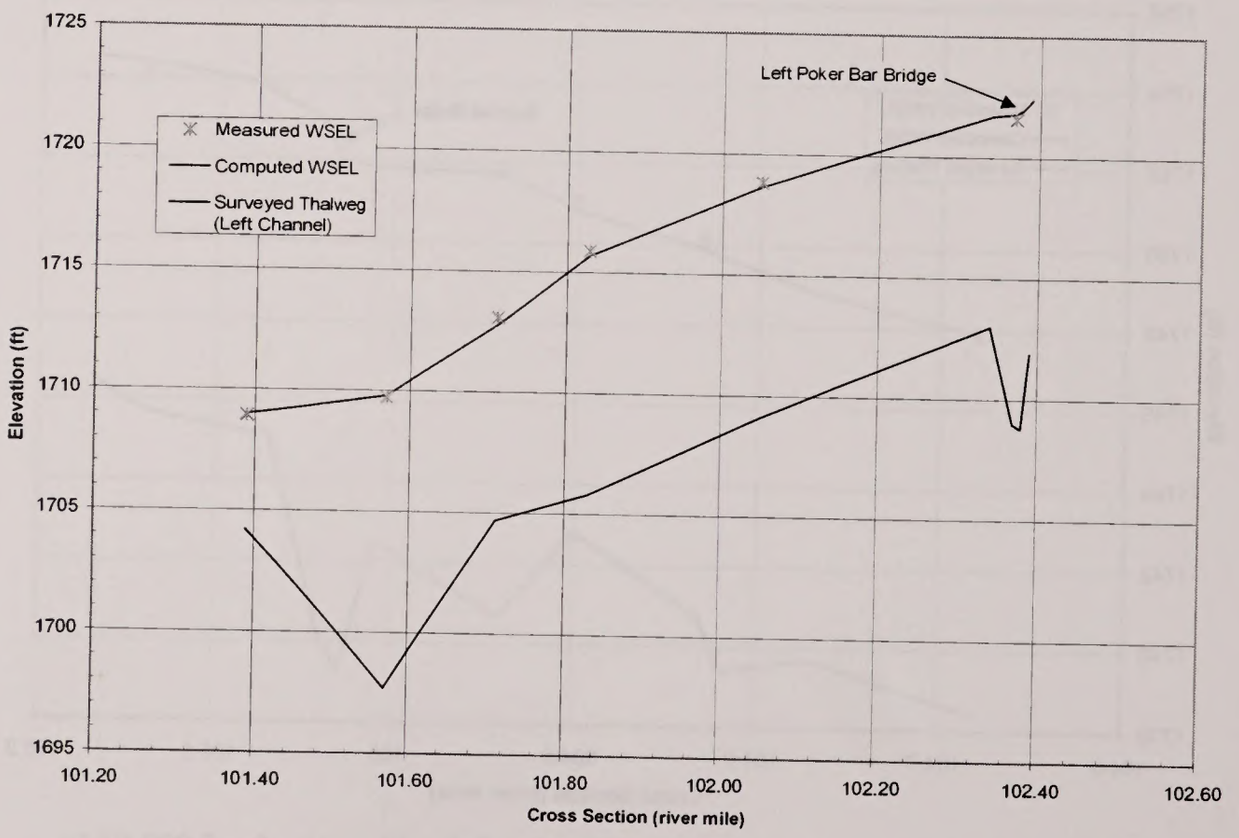
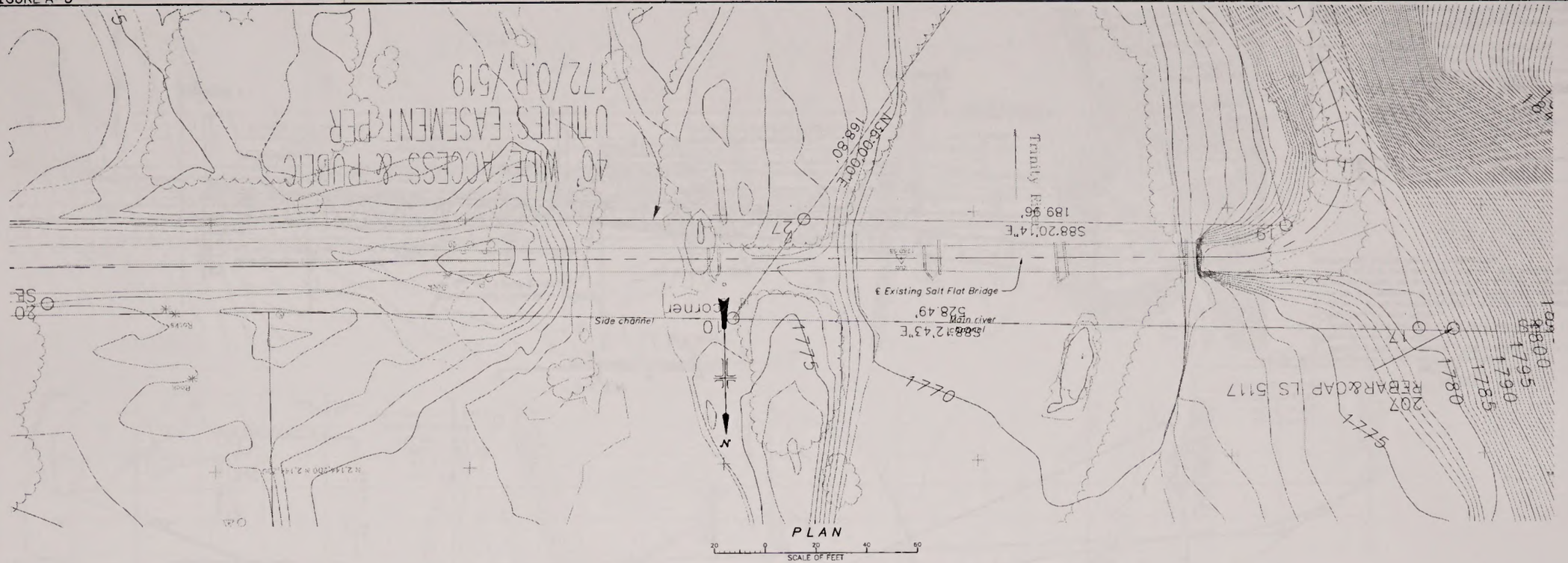


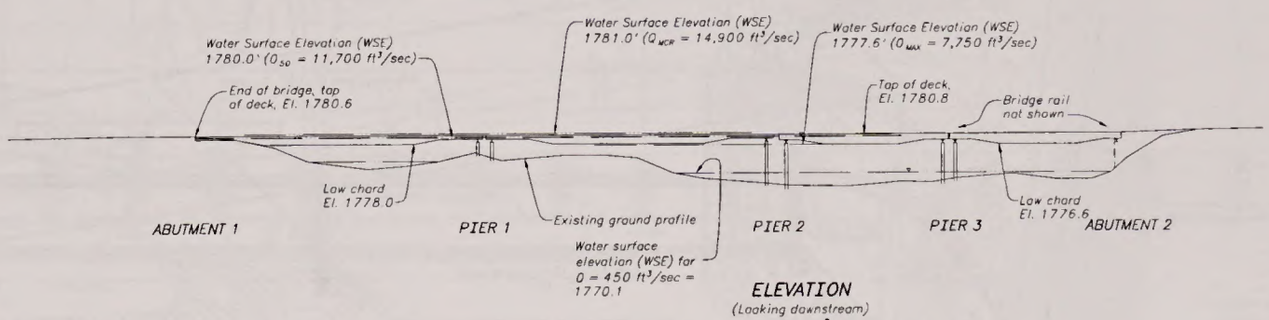
Figure A-4. Treadwell Bridge hydraulic model calibration for 5,000 ft^3/s

FIGURE A-5



PLAN

SCALE OF FEET


Water Surface Elevation (WSE) 1780.0' (Q_{50} = 11,700 ft³/sec)
Water Surface Elevation (WSE) 1781.0' (Q_{MCR} = 14,900 ft³/sec)
Water Surface Elevation (WSE) 1777.6' (Q_{MAX} = 7,750 ft³/sec)
End of bridge, top of deck, El. 1780.6
Top of deck, El. 1780.8
Bridge rail not shown
Low chord El. 1778.0
Low chord El. 1776.6
Existing ground profile
Water surface elevation (WSE) for Q = 450 ft³/sec = 1770.1
ABUTMENT 1
PIER 1
PIER 2
PIER 3
ABUTMENT 2

ELEVATION

(Looking downstream)

NOTES

1. Existing pier and abutment pile foundation depth is unknown.
2. The January 1, 1997 flood flow is estimated to be 11,000 ft³/sec. Hydraulic analysis using this flow, results in a water surface elevation estimated to be 1779.4 feet, indicating that the flow was backed up by the bridge, but the bridge was not overtapped.
3. The peak ROD flow release in May at Lewiston Oam is 11,000 ft³/sec. Including Q_{50} tributary flows upstream of Rush Creek, the water surface elevation for this flow is estimated to be 1780.0, which is above the bridge low chord.

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TRINITY RIVER BRIDGES

SALT FLAT BRIDGE

EXISTING BRIDGE

PLAN AND PROFILE

DESIGNED JESUS G. ROMERO CHECKED Name

DRAWN JESUS G. ROMERO TECH. APPR. Name

PEER REVIEW Name WATER CONVEYANCE GROUP

CADD SYSTEM AutoCAD Rel. 13.06 CADD FILENAME Salt_Flat-Alt1.DWG

DENVER, COLORADO MARCH 26, 2003 SHEET 1 OF 1 FIGURE A-5

SPECIFICATIONS NO. 0000

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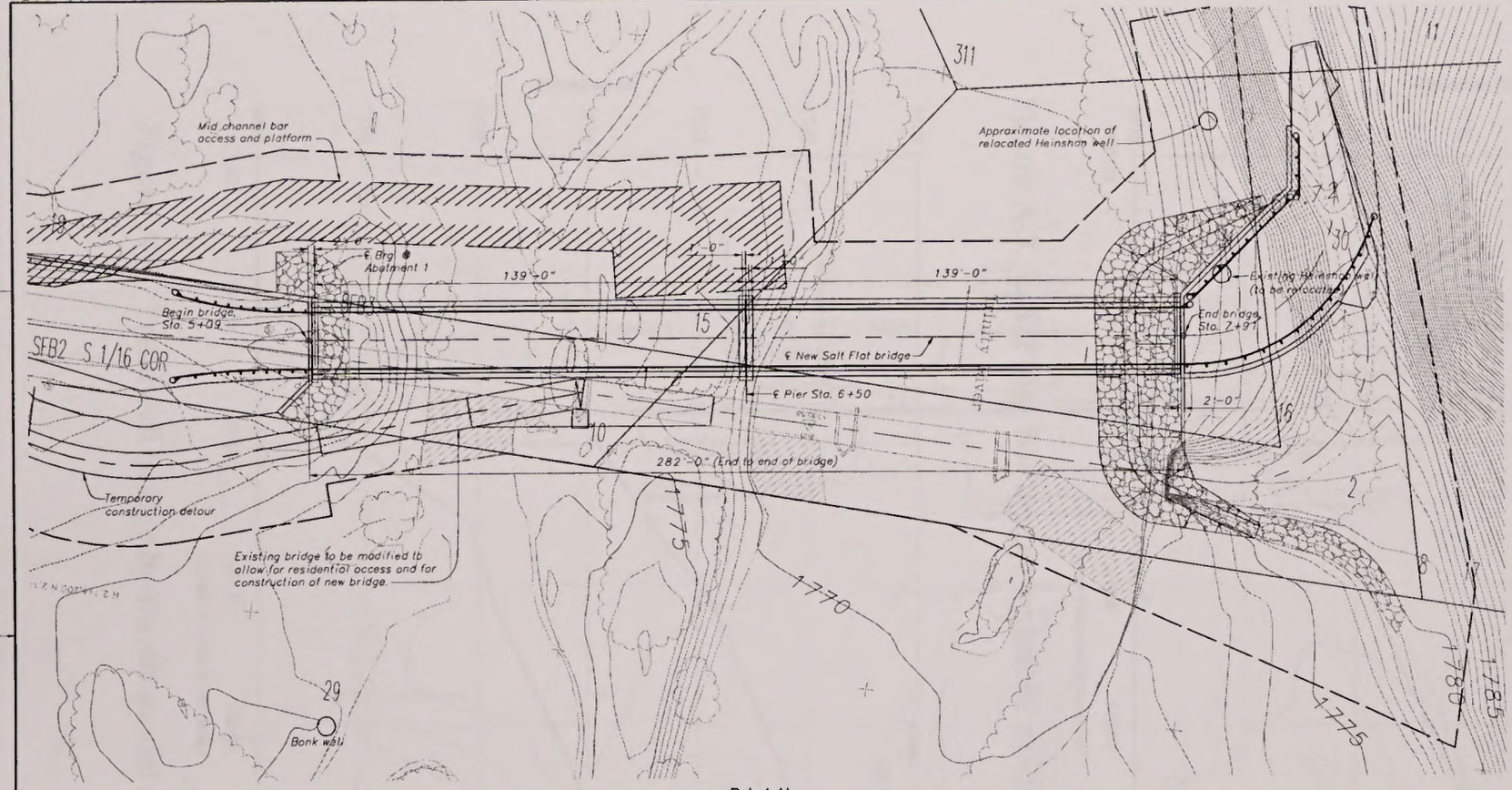
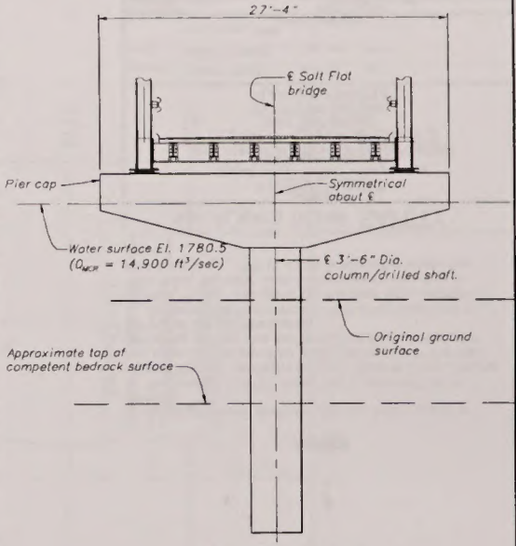
APRIL 7, 2003 14:06

FIGURE A-6

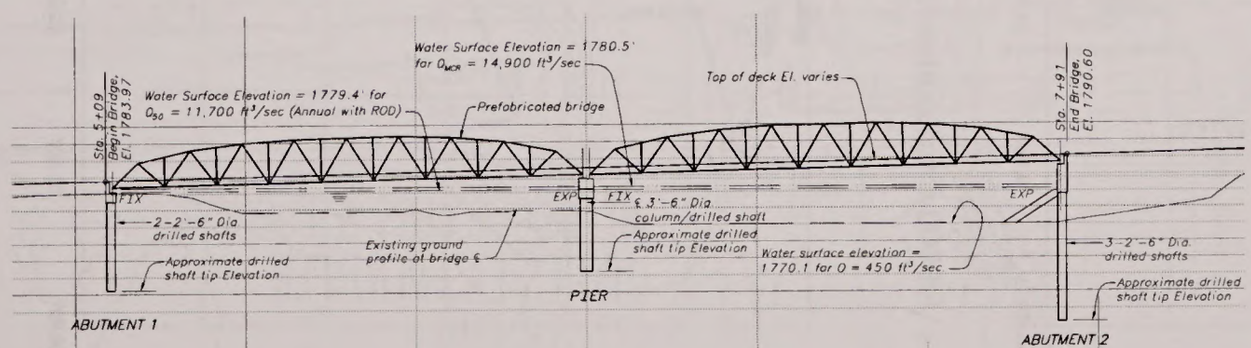


PLAN

SCALE OF FEET


27'-4"
℄ Salt Flat bridge
Pier cap
Symmetrical about ℄
Water surface El. 1780.5 (Q_{MCR} = 14,900 ft³/sec)
℄ 3'-6" Dia. column/drilled shaft.
Original ground surface
Approximate top of competent bedrock surface

ELEVATION @ PIER


Water Surface Elevation = 1780.5' for Q_{MCR} = 14,900 ft³/sec
Top of deck El. varies
Sta. 5+09 Begin Bridge, El. 1783.97
Water Surface Elevation = 1779.4' for Q_{50} = 11,700 ft³/sec (Annual with ROD)
Prefabricated bridge
Sta. 7+91 End Bridge, El. 1790.60
FIX
EXP
FIX
EXP
℄ 3'-6" Dia. column/drilled shaft
2-2'-6" Dia. drilled shafts
Existing ground profile at bridge ℄
Approximate drilled shaft tip Elevation
Water surface elevation = 1770.1 for Q = 450 ft³/sec
3-2'-6" Dia. drilled shafts
Approximate drilled shaft tip Elevation
ABUTMENT 1
PIER
ABUTMENT 2

NOTES

1. For general notes, see 416-D-3490.
2. Water surface elevation = 1779.9 feet for Q_{100} = 12,900 ft³/sec (Annual with ROD).
3. Water surface elevation = 1779.4 feet for Q_{50} = 11,700 ft³/sec (Annual with ROD).
4. Span 1 of the existing bridge will have to be relocated to allow for construction of new bridge. This will require a temporary detour, temporary abutment support, modifications to exisiting pier and rail road flat car. See Section 01558 Maintaining Access During Construction.

PRELIMINARY

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MARCH 7, 2003

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SALT FLAT BRIDGE

PROPOSED ACTION – STEEL TRUSS BRIDGE PLAN, PROFILE, AND SECTION

DESIGNED	JESUS G. ROMERO	CHECKED	CHECKED
DRAWN	JESUS G. ROMERO	TECH. APPR.	TECH. APPROVAL
APPROVED	APPROVED PER REVIEW TITLE		

CADD SYSTEM: AutoCAD Rel. 15.06
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FIGURE A-6

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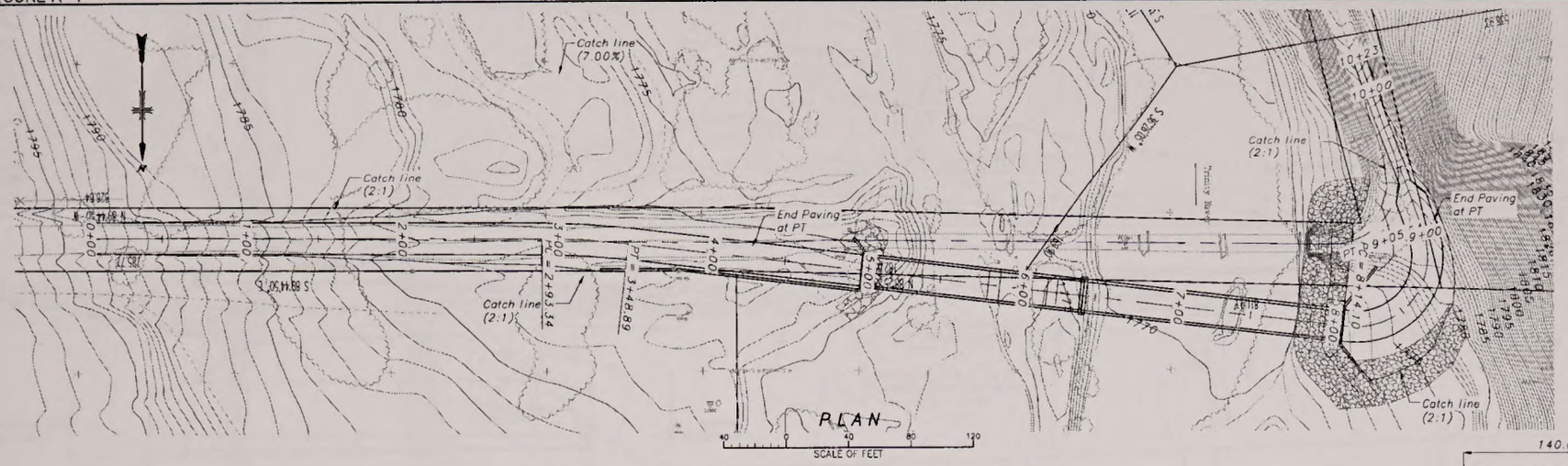
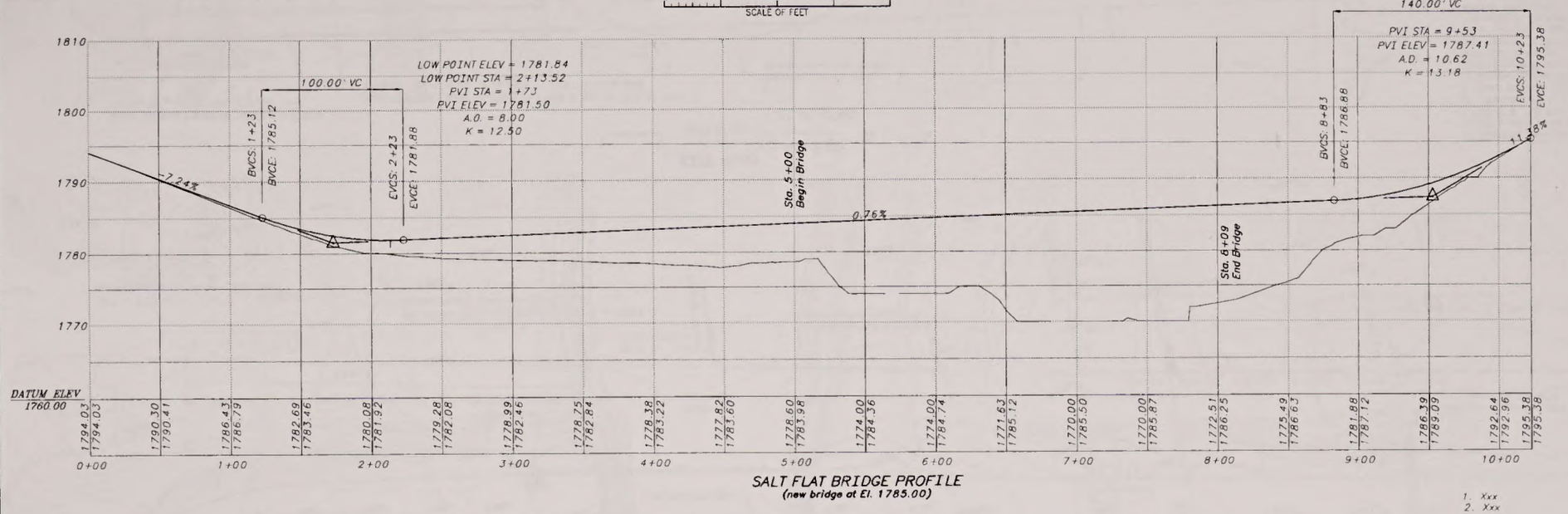
FIGURE A-7





SALT FLAT BRIDGE PROFILE
(new bridge at El. 1785.00)

NOTES

1. Xxx
2. Xxx

PRELIMINARY

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TRINITY RIVER BRIDGES
SALT FLAT BRIDGE
ALTERNATIVE 1 – UPSTREAM TRUSS
PLAN AND PROFILE

DESIGNED ANNE MCDANIEL CHECKED Name
DRAWN ANNE MCDANIEL TECH. APPR. Name
PEER REVIEW Name WATER CONVEYANCE GROUP

CADD SPATED AutoCAD Rel. 14.01 DENVER, COLORADO FEBRUARY 21, 2003 SHEET 1 OF 1

CADD FILENAME SALT_FLAT_BRIDGE_UPSTRM.DWG

FIGURE A-7

SOLICITATION NO. 0000

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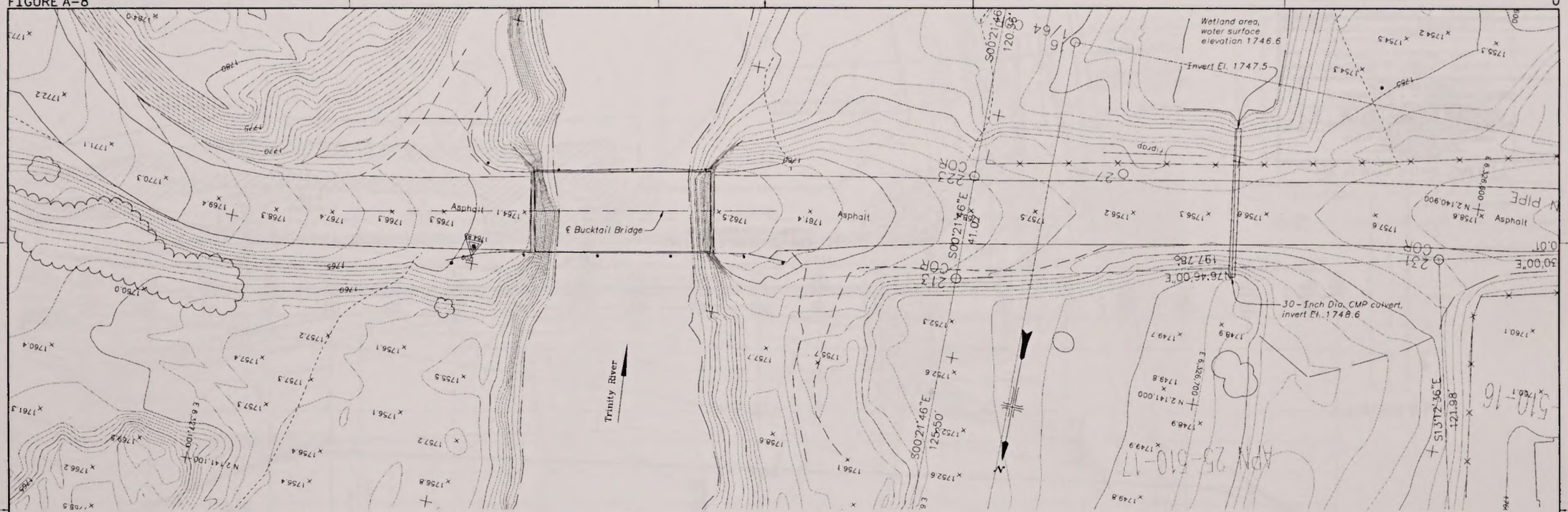
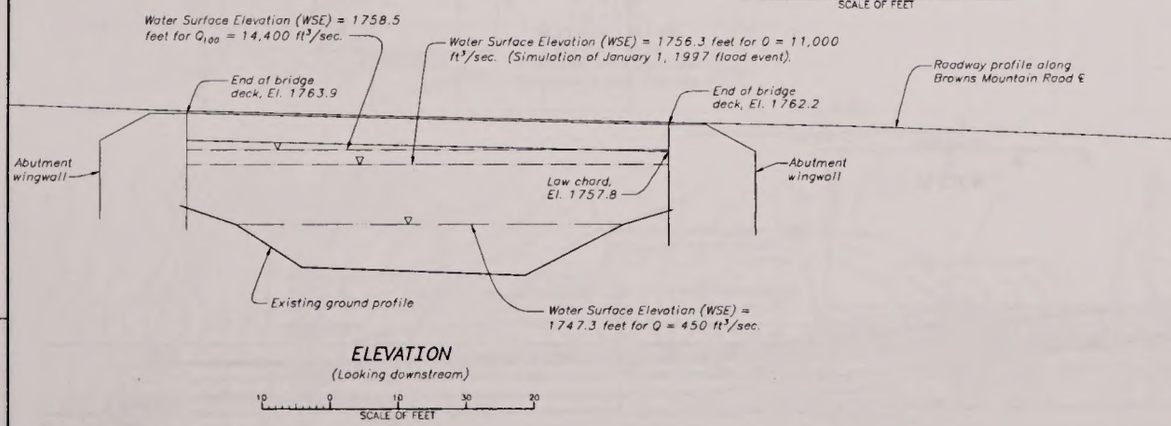
FIGURE A-8



SITE PLAN

SCALE OF FEET


Water Surface Elevation (WSE) = 1758.5 feet for Q_{100} = 14,400 ft³/sec.
Water Surface Elevation (WSE) = 1756.3 feet for Q = 11,000 ft³/sec. (Simulation of January 1, 1997 flood event).
End of bridge deck, El. 1763.9
End of bridge deck, El. 1762.2
Roadway profile along Browns Mountain Road ℄
Abutment wingwall
Low chord, El. 1757.8
Abutment wingwall
Existing ground profile
Water Surface Elevation (WSE) = 1747.3 feet for Q = 450 ft³/sec.

ELEVATION

(Looking downstream)

SCALE OF FEET

NOTES

1. Existing abutments are supported by steel piles. The existing steel piles have an estimated tip elevation of 1720.5' ± 1.0 foot.
2. The January 1, 1997 flood flow is estimated to be 11,000 ft³/sec. Hydraulic analysis using this flow results in a water surface elevation estimated to be 1756.3 feet, indicating that the flow passed under the bridge low chord, with approximately 1.5 feet of freeboard. The peak R00 flow release in May is 11,000 downstream of Lewiston Dam. Including Q_{50} tributary flows, Q_{50} = 11,700 ft³/sec. The water surface elevation is 1756.8. However, the road west of the bridge is overtopped.

30-Inch Dia. CMP culvert, invert El. 1748.6

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TRINITY RIVER BRIDGES

BUCKTAIL BRIDGE
ALTERNATIVE 1 DESIGN
PLAN AND PROFILE

DESIGNED	JESUS ROMERO	CHECKED	Name
DRAWN	JESUS ROMERO	TECH. APPR.	Name
PEER REVIEW	Name		

CADD SYSTEM: AutoCAD Rel. 13.05
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FIGURE A-8

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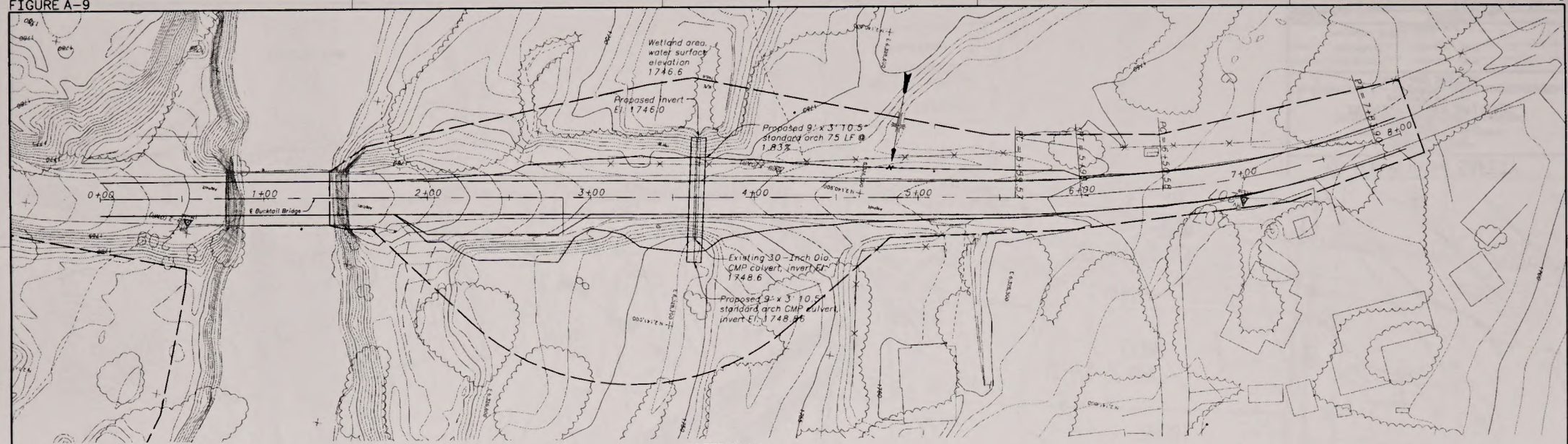
APR 12 4, 2002 14:21

FIGURE A-9



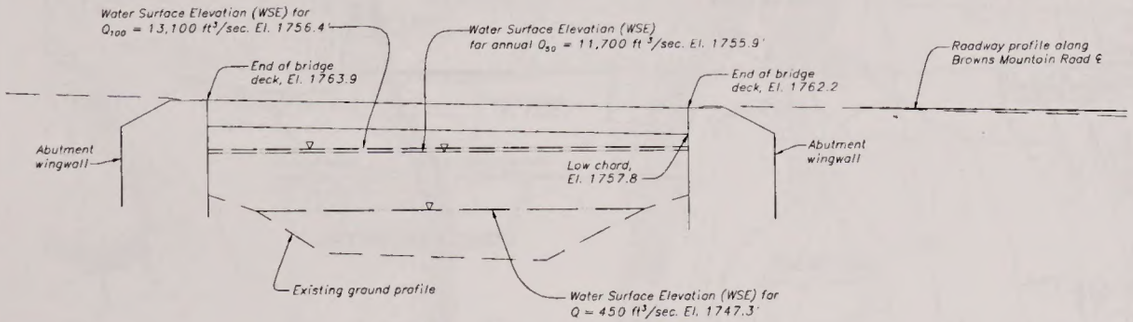
SITE PLAN

30 0 30 60 90
SCALE OF FEET

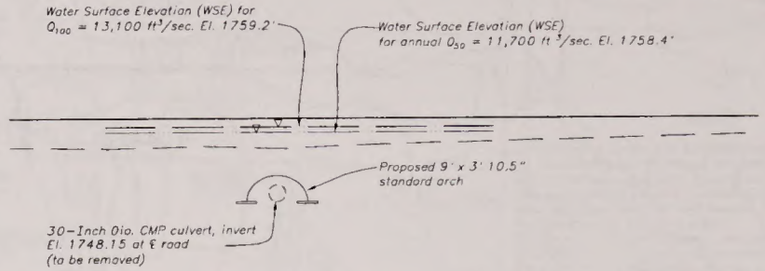
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

February 5, 2003


Water Surface Elevation (WSE) for Q100 = 13,100 ft³/sec. El. 1756.4
Water Surface Elevation (WSE) for annual Q50 = 11,700 ft³/sec. El. 1755.9'
End of bridge deck, El. 1763.9
End of bridge deck, El. 1762.2
Roadway profile along Browns Mountain Road ℄
Abutment wingwall
Low chord, El. 1757.8
Abutment wingwall
Existing ground profile
Water Surface Elevation (WSE) for Q = 450 ft³/sec. El. 1747.3'

ELEVATION
(Looking downstream)


Water Surface Elevation (WSE) for Q100 = 13,100 ft³/sec. El. 1759.2'
Water Surface Elevation (WSE) for annual Q50 = 11,700 ft³/sec. El. 1758.4'
Proposed 9' x 3' 10.5" standard arch
30-Inch Dia. CMP culvert, invert El. 1748.15 at ℄ road (to be removed)

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TRINITY RIVER BRIDGES

BUCKTAIL BRIDGE

PROPOSED ACTION – RAISED ROAD AND CMP ARCH PLAN AND PROFILE

DESIGNED – Anne McDaniel – CHECKED – Name
DRAWN – Anne McDaniel – TECH. APPR. – Name
PEER REVIEW – Name
ID GROUP

CADD SYSTEM: AutoCAD Rel. 13.06
DENVER, COLORADO FEBRUARY 21, 2003
SHEET 1 OF 1

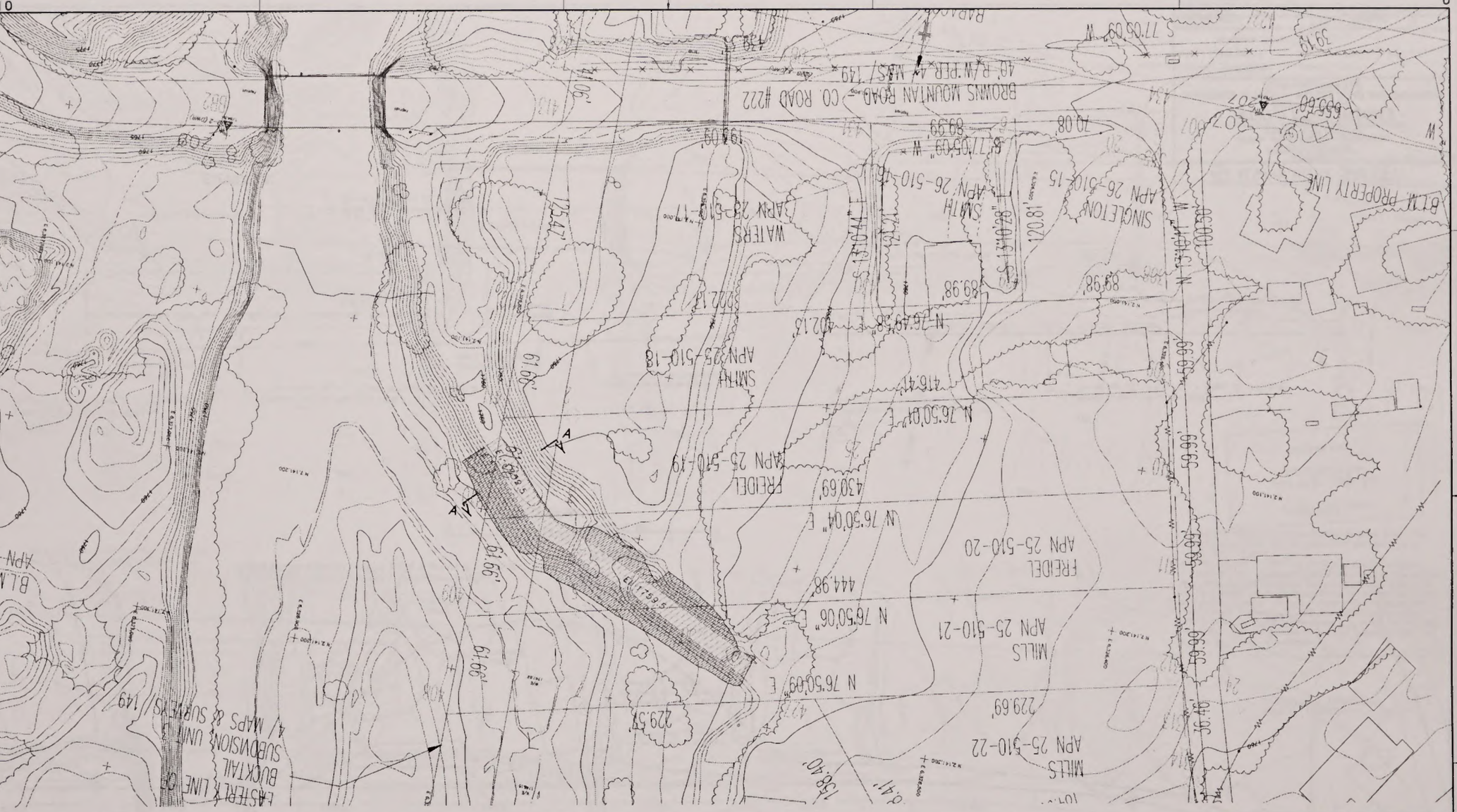
CADD FILENAME: BUCKTAIL_BRIDGE.DWG

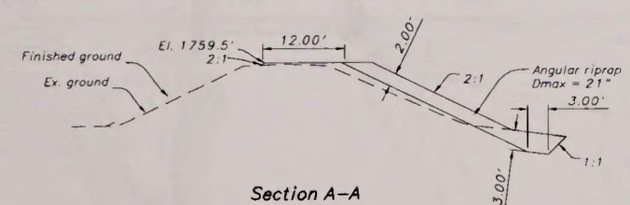
FIGURE A-9

SOLICITATION NO. 0000

FILE PATH: H:\Home\Civil\Eng Share\PROJ\416\Trinity River Bridges_Drawings\Bridges\
PLOTTED BY: JROMERO
APRIL 7, 2003 13:19

FIGURE A-10





Section A-A

SITE PLAN

30 0 30 60 90
SCALE OF FEET

PRELIMINARY

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February 6, 2003

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TRINITY RIVER MAINSTEM FISHERY RESTORATION

TRINITY RIVER BRIDGES

BUCKTAIL BRIDGE

ALTERNATIVE 1 - UPSTREAM LEVEE AUGMENTATION
PLAN AND SECTION

DESIGNED - Anne McDaniel - CHECKED - Name
DRAWN - Anne McDaniel - TECH. APPR. - Name
PEER REVIEW - Name
WATER CONVEYANCE GROUP

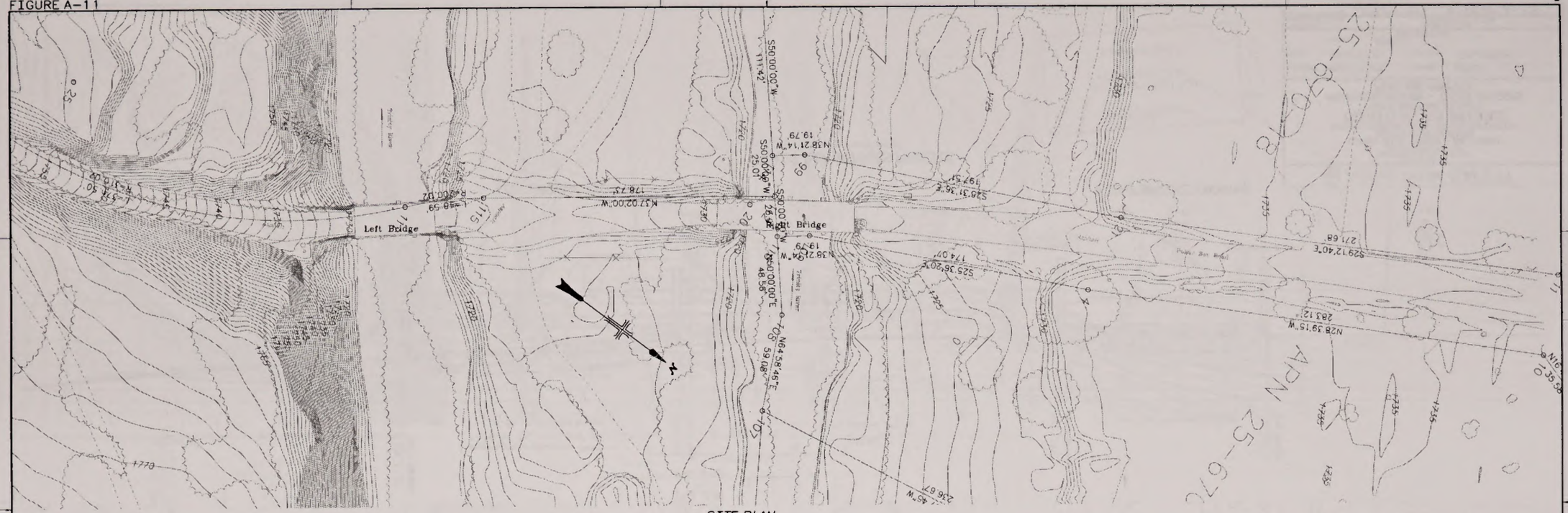
CADD SYSTEM: MicroStation SE, J 08.06
DENVER, COLORADO
CADD FILENAME: BUCKTAIL_ALT1.DWG
FEBRUARY 21, 2003
SHEET 1 OF 1

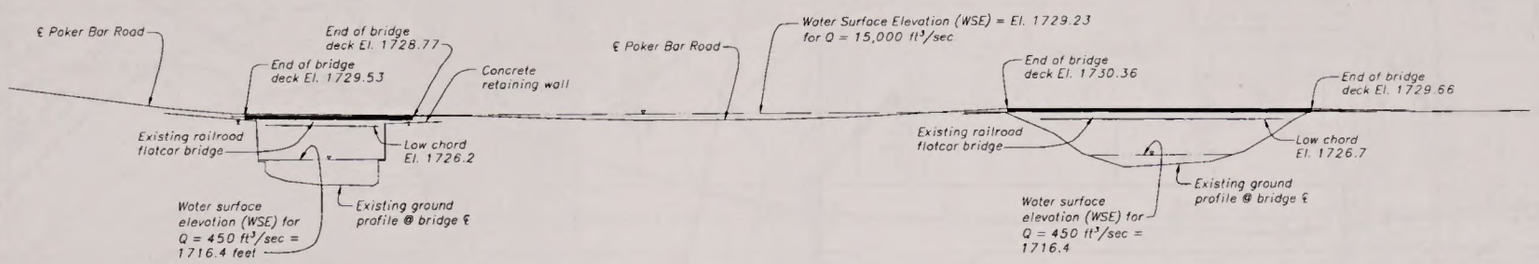
FIGURE A-10

SOLICITATION NO. 0000

FILE PATH: K:\Users\Civil\Eng Shared\Arcs\4 16\Trinity River Bridges_Drawings\masterwork\
PLOTTED: Wed
APRIL 2, 2003 13:55

FIGURE A-11




℄ Poker Bar Road
End of bridge deck El. 1728.77
End of bridge deck El. 1729.53
Concrete retaining wall
Existing railroad flatcar bridge
Low chord El. 1726.2
Water surface elevation (WSE) for Q = 450 ft³/sec = 1716.4 feet
Existing ground profile @ bridge ℄
LEFT BRIDGE (SOUTH)
℄ Poker Bar Road
Water Surface Elevation (WSE) = El. 1729.23 for Q = 15,000 ft³/sec
End of bridge deck El. 1730.36
End of bridge deck El. 1729.66
Existing railroad flatcar bridge
Low chord El. 1726.7
Existing ground profile @ bridge ℄
Water surface elevation (WSE) for Q = 450 ft³/sec = 1716.4
RIGHT BRIDGE (NORTH)

ELEVATION
(Looking downstream)

Poker Bar Bridges (looking downstream)

20 0 20 40 60
SCALE OF FEET

NOTES

1. Existing abutment pile foundation depth is unknown.
2. The January 1, 1997 flood flow is estimated to be 15,000 ft³/sec. Hydraulic analysis using this flow, results in a water surface elevation estimated to be 1729.23 ft., indicating that Poker Bar road between the bridges was inundated during this flood event.
3. The peak ROD flow release in May at Lewiston Dam is 11,000 ft³/sec. Including Q_{60} tributary flows upstream of Rush and Gross Valley Creeks, the Q_{60} = 12,500 ft³/sec. The water surface elevation for this flow is estimated to be 1727.7, which is above the low chord.

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TRINITY RIVER BRIDGES
POKER BAR BRIDGE
EXISTING STRUCTURES
PLAN AND PROFILE

DESIGNED JESUS ROMERO CHECKED Name
DRAWN JESUS ROMERO TECH. APPR. Name
PEER REVIEW Name
BY GROUP

CAD SYSTEM AutoCAD Rel. 13.06
DRAWING NAME POKER_BAR_A1 - 1.DWG
DENVER, COLORADO MARCH 30, 2002
SHEET 1 OF 1

FIGURE A-11

SPECIFICATIONS NO. 0000

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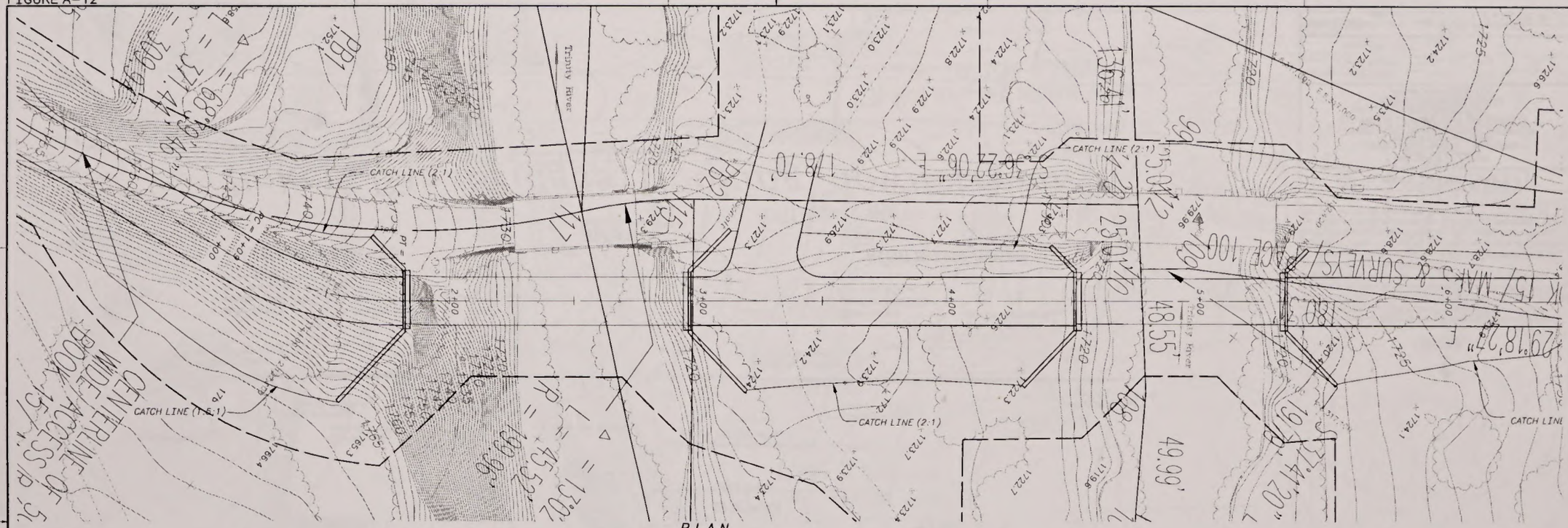
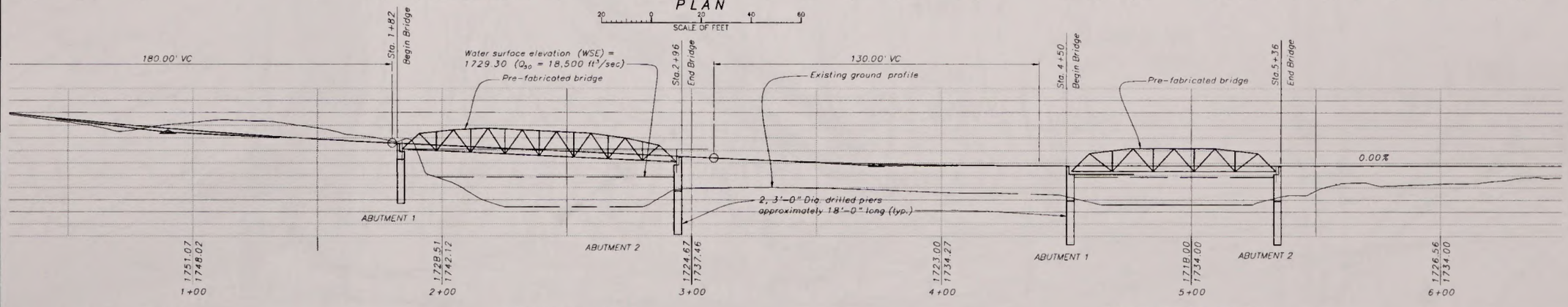
PLOTTED BY: JROMERO
APRIL 7, 2003 14:25

FIGURE A-12





LEFT BRIDGE (SOUTH)

RIGHT BRIDGE (NORTH)

POKER BAR BRIDGES PROFILE
(Looking downstream)

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FEBRUARY 21, 2003

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TRINITY RIVER BRIDGES

POKER BAR ROAD BRIDGES
PROPOSED ACTION – TRUSS BRIDGES
PLAN AND PROFILE

DESIGNED Jesus G. Romero CHECKED CHECKED
DRAWN Jesus G. Romero TECH. APPR. TECH. APPROVAL
APPROVED APPROVED
POR REVIEW (TITLE)

CADD SYSTEM AutoCAD Rel. 14.06
CADD FILENAME POKER-BRDG-FLOWG
DENVER, COLORADO FEBRUARY 21, 2003
SHEET 1 OF 1

FIGURE A-12

SOLICITATION NO. 0000

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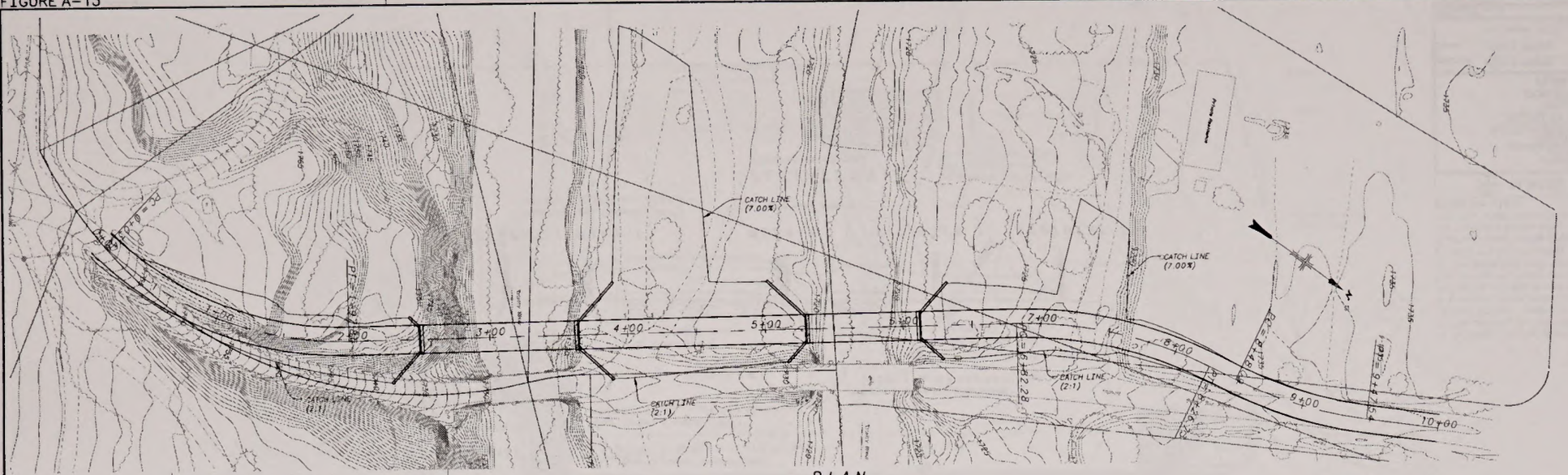
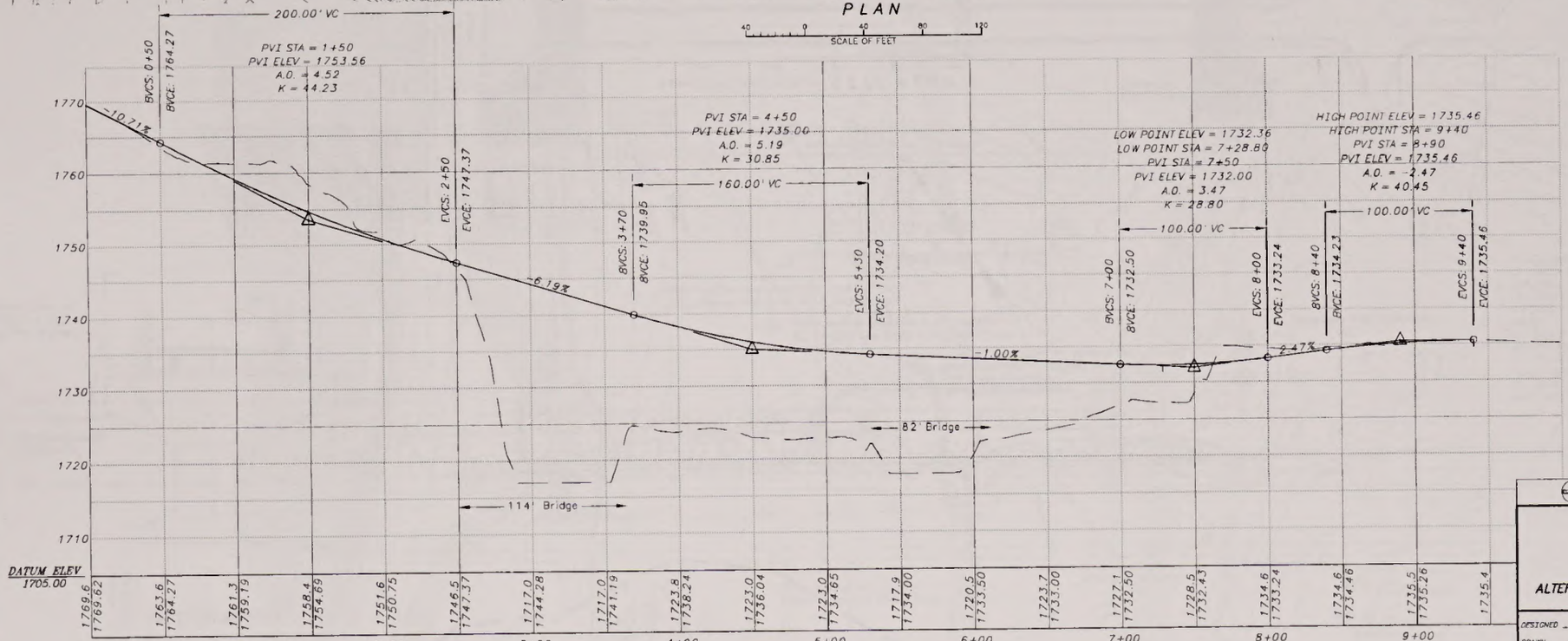
PLOTTED BY: RICHARD
APR 11 7 2003 14:27

FIGURE A-13



PLAN

SCALE OF FEET



POKER BAR BRIDGE PROFILE

(new bridge at El. 1732.00)

PRELIMINARY

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TRINITY RIVER BRIDGES

POKER BAR ROAD BRIDGES

ALTERNATIVE 1 – DOWNSTREAM TRUSS BRIDGES

PLAN AND PROFILE

DESIGNED Anne McDaniel CHECKED Name

DRAWN Anne McDaniel TECH. APPR. Name

PEER REVIEW Name
WATER CONSERVANCE GROUP

CADD SYSTEM: AutoCAD Rel. 15.06
DENVER, COLORADO

DATE: FEBRUARY 21, 2003

SHEET 1 OF 1

JOB TITLE/NAME: POKER-TRSTRN.DWG

FIGURE A-13

SOLICITATION NO. 0000

FILE PATH: M:\Users\CivilEng Shares\PROJ\416\Trinity River Bridges_Drawings\roadwork\
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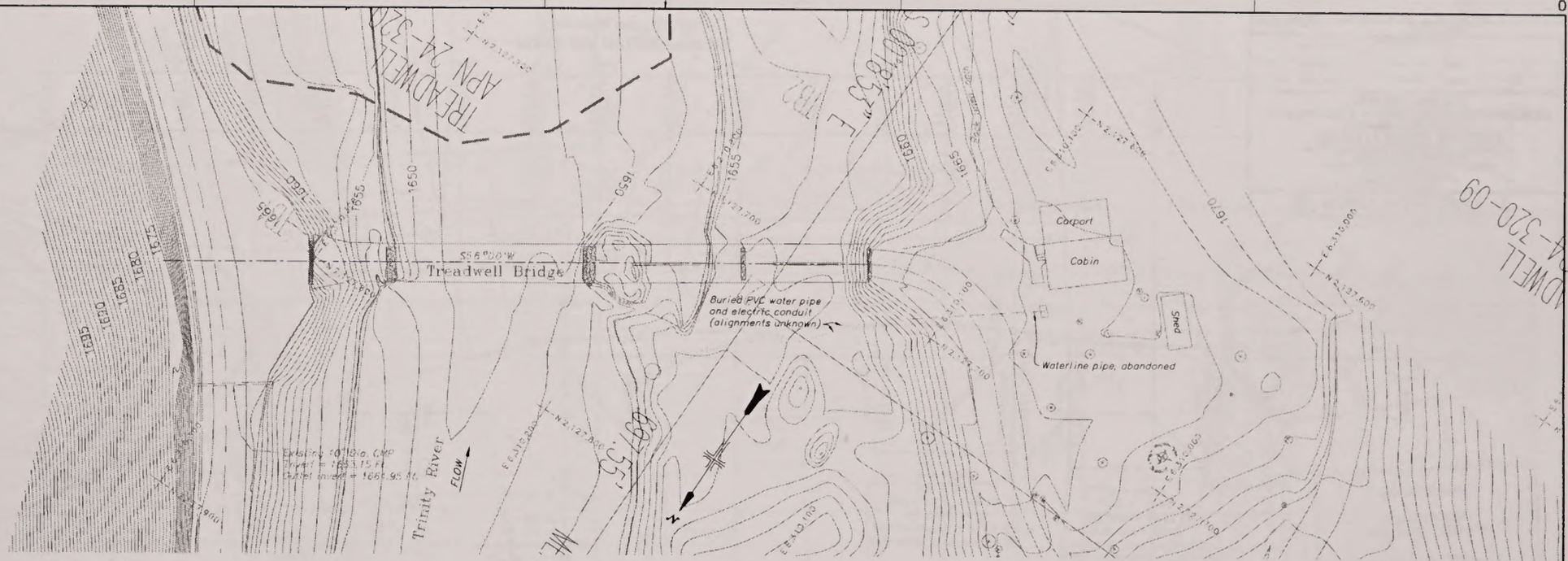
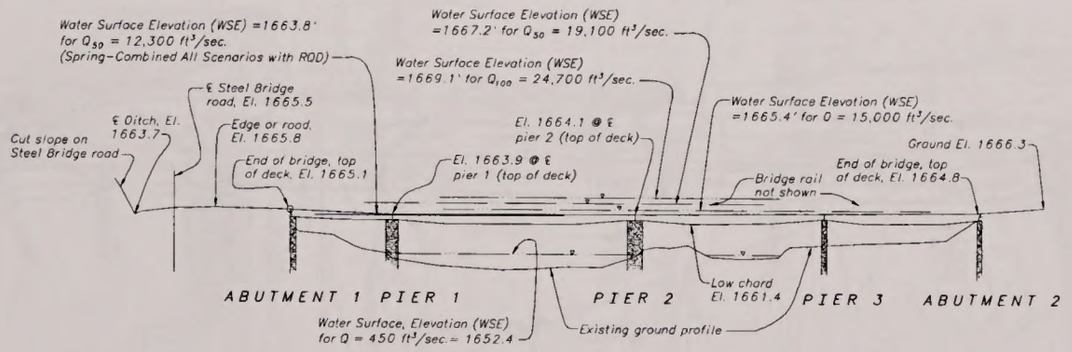
APRIL 7, 2003 14:37

FIGURE A-14



SITE PLAN

20 0 20 40 60
SCALE OF FEET


Water Surface Elevation (WSE) =1663.8' for Q_{50} = 12,300 ft³/sec. (Spring-Combined All Scenarios with ROD)
Water Surface Elevation (WSE) =1667.2' for Q_{50} = 19,100 ft³/sec.
Water Surface Elevation (WSE) =1669.1' for Q_{100} = 24,700 ft³/sec.
Water Surface Elevation (WSE) =1665.4' for Q = 15,000 ft³/sec.
℄ Steel Bridge road, El. 1665.5
℄ Ditch, El. 1663.7
Edge of road, El. 1665.8
Cut slope on Steel Bridge road
End of bridge, top of deck, El. 1665.1
El. 1664.1 @ ℄ pier 2 (top of deck)
El. 1663.9 @ ℄ pier 1 (top of deck)
Ground El. 1666.3
Bridge rail not shown
End of bridge, top of deck, El. 1664.8
Low chord El. 1661.4
ABUTMENT 1
PIER 1
PIER 2
PIER 3
ABUTMENT 2
Water Surface, Elevation (WSE) for Q = 450 ft³/sec.= 1652.4
Existing ground profile

ELEVATION
(Looking downstream)

NOTES

1. Existing pier and abutment depth is unknown.
2. The January 1, 1997 flood flow is estimated to be 15,000 ft³/sec. Hydraulic analysis using this flow results in a water surface elevation estimated to be 1665.4 feet indicating that the bridge deck was overtopped by about 1.3 Feet during this flood event.
3. The peak ROD flow release in May at Lewiston Dam is 11,000 ft³/sec including Q_{50} tributary flows upstream of Rush and Grass Valley Creeks, the Q_{50} = 12,500 ft³/sec at the Treadwell bridge site. The water surface elevation for this flow is estimated to be 1664.0, which is above the bridge low chord.

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TRINITY RIVER BRIDGES

TREADWELL BRIDGE
CONCEPT NO. 1 DESIGN
PLAN AND PROFILE

DESIGNED JESUS G. ROMERO CHECKED Name
DRAWN JESUS G. ROMERO TECH. APPR. Name
PEER REVIEW Name
WATER CONFIDENCE GROUP
CADD SYSTEM AutoCAD Rel. 14.06
CADD FILENAME TREADWELL_AT_1.DWG
DENVER, COLORADO FEBRUARY 25, 2002 SHEET 1 OF 1

FIGURE A-14

SPECIFICATIONS NO. 0000

FILE PATH: K:\Home\CivilEng Share\PROJ\416\Trinity River Bridges_Drawings\Conceptual design drawings\
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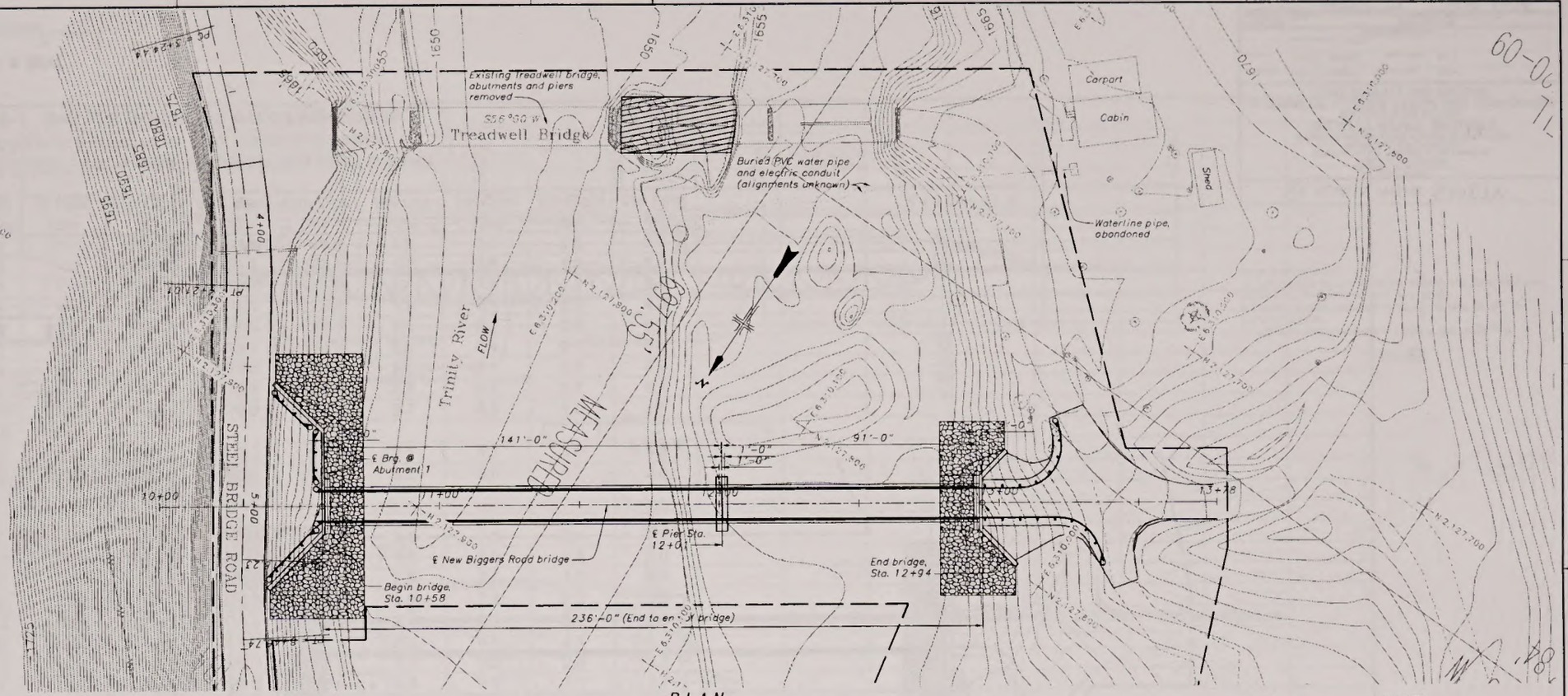
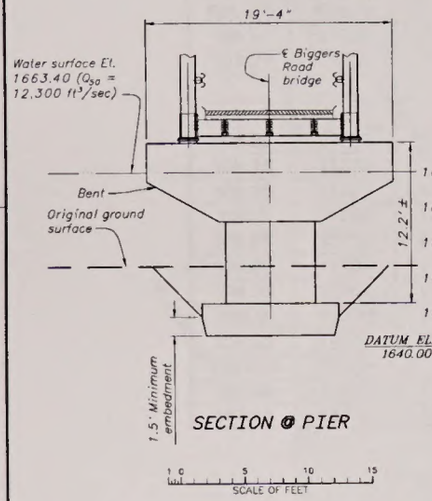
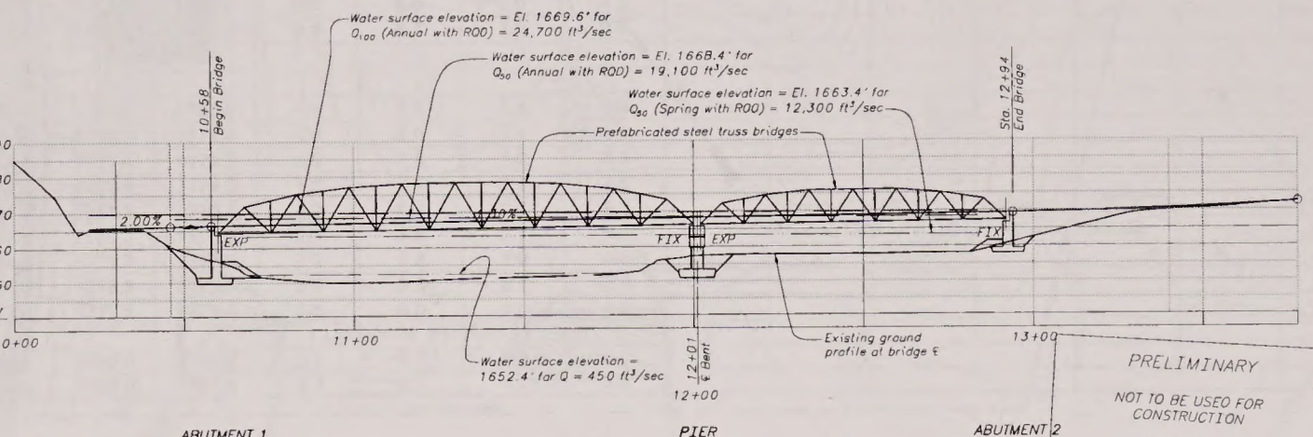
APRIL 7, 2003 13:01

FIGURE A-15






Water surface elevation = El. 1669.6' for Q_{100} (Annual with ROD) = 24,700 ft³/sec
Water surface elevation = El. 1668.4' for Q_{50} (Annual with ROD) = 19,100 ft³/sec
Water surface elevation = El. 1663.4' for Q_{50} (Spring with ROD) = 12,300 ft³/sec
Prefabricated steel truss bridges
10+58 Begin Bridge
Sta. 12+94 End Bridge
2.00%
EXP
FIX
EXP
FIX
Water surface elevation = 1652.4' for Q = 450 ft³/sec
12+01 ℄ Bent
Existing ground profile at bridge ℄
ABUTMENT 1
PIER
ABUTMENT 2
BIGGERS ROAD BRIDGE PROFILE

NOTES

1. For general notes, see 416-D-3490.
2. Water surface elevation = 1669.6 feet for Q_{100} = 24,700 ft³/sec (Annual with ROD).
3. Water surface elevation = 1663.4 feet for Q_{50} = 12,300 ft³/sec (Combined all scenarios Flow, Spring with ROD).
4. New bridge is located approximately 137 feet upstream of existing bridge.
5. The Biggers Road bridge superstructure is designed to be overtopped when the flow exceeds 15,000 ft³/sec.
6. Load rating report indicates existing Treadwell bridge does not meet HS20-44 rating, see Section 01550.

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TRINITY RIVER MAINSTEM FISHERY RESTORATION

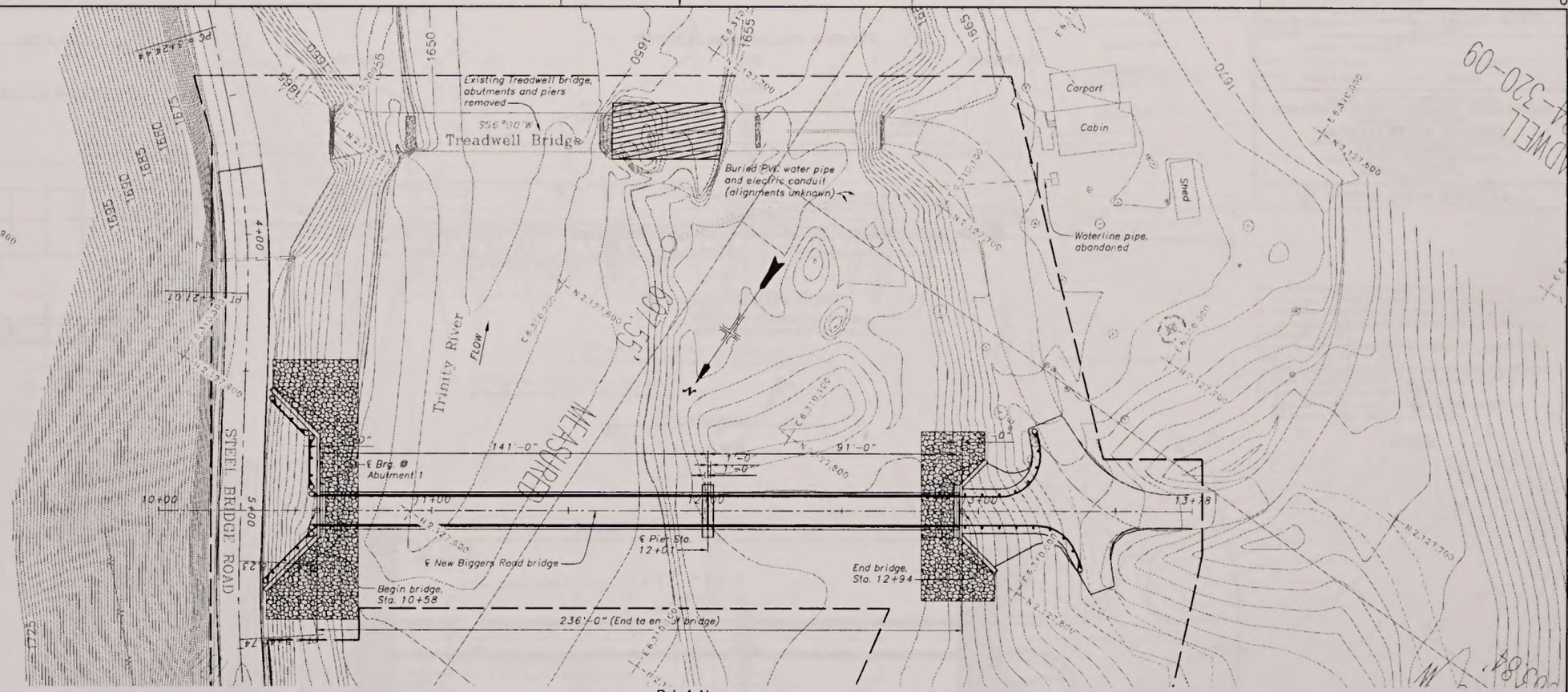
TRINITY RIVER BRIDGES
BIGGERS ROAD BRIDGE
PROPOSED ACTION–OVERTOPPED TRUSS BRIDGE PLAN, PROFILE AND SECTION

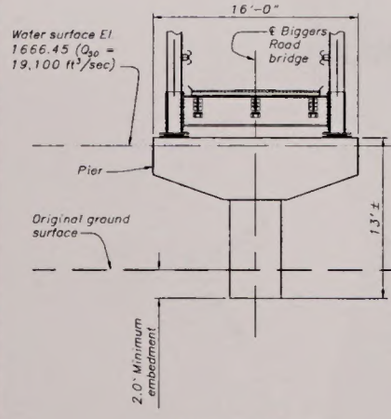
DESIGNED	JESUS G. ROMERO	CHECKED	CHECKED
DRAWN	JESUS G. ROMERO	TECH. APPR.	TECH. APPROVAL
APPROVED	APPROVED PEER REVIEW TITLE		

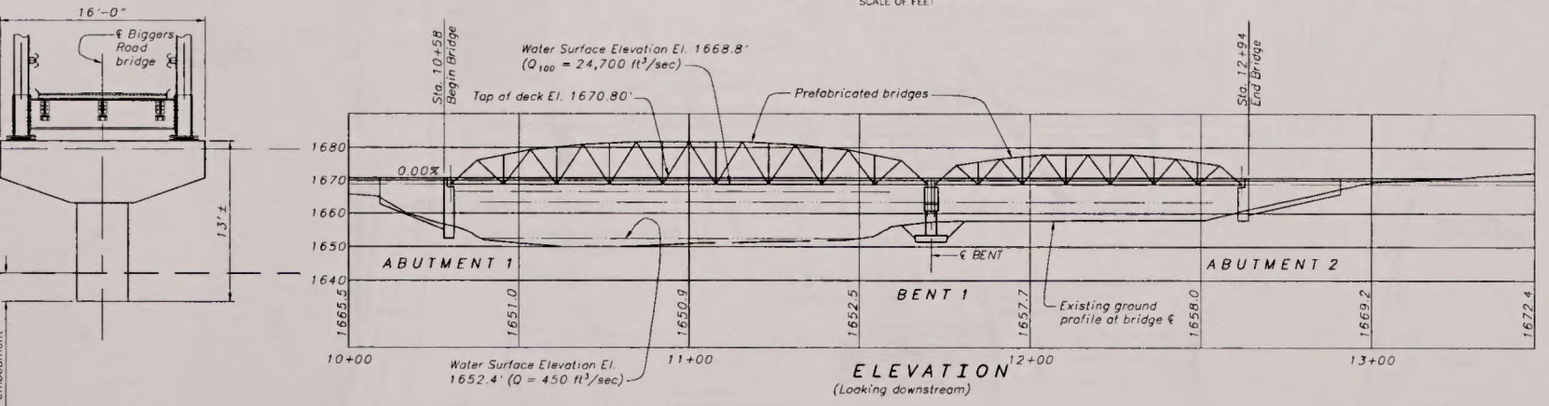
CADD SYSTEM: AutoCAD Rel. 13.06, DENVER, COLORADO
CADD FILENAME: 416-D-3494.DWG
MARCH 7, 2003
SHEET 1 OF 1
FIGURE A-15
SOLICITATION NO. 20-C0598

FILE PATH: H:\Home\Civil\eng Share\PROJ\416\Trinity River Bridges_Drawings\Bridges\
PLOTTED BY: JROMERO
APRIL 7, 2003 13:05

FIGURE A-16







NOTES

1. Water Surface Elevation = 1668.8 feet for Q_{100} = 24,700 ft³/sec.
2. Water Surface Elevation = 1666.45 feet for Q_{50} = 19,100 ft³/sec (Annual Flow, with R00).
2. New bridge is located approximately 137 feet upstream of existing bridge.

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TRINITY RIVER BRIDGES

BIGGERS ROAD BRIDGE
ALTERNATIVE 1 – TRUSS BRIDGE (NOT OVERTOPPED)
PLAN, PROFILE AND SECTION

DESIGNED _ JESUS G. ROMERO _ CHECKED _ Name
DRAWN _ JESUS G. ROMERO _ TECH. APPR. _ Name
PEER REVIEW _ Name
WATER CONVEYANCE GROUP

CADD SYSTEM: AutoCAD Rel. 14.06, DENVER, COLORADO
CADD FILENAME: BIGGERS ROAD BRIDGE.DWG
FEBRUARY 21, 2003
SHEET 1 OF 1

FIGURE A-16

SOLICITATION NO. 0000

FILE PATH: H:\Work\Civil\Eng Sheet\APD\4161\Trinity River Bridges_Drawings\Bridges\
PLOTTED BY: JROMERO
FEBRUARY 21, 2003 14:17

Table A-1. Salt Flat Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
105.99	11000	1757.34	1767.8	1768.6	1.3	7.4	2.3	5.5
106.13	11000	1756.85	1769.1	1770.0	1.7	7.8	1.3	5.9
106.35	11000	1760.5	1771.1	1771.9	2.4	7.5	1.0	5.5
106.6	11000	1762.9	1773.1	1773.7	1.5	7.1	2.2	4.5
106.65	11000	1764.2	1775.5	1776.1	2.1	6.2	2.0	5.2
106.67	11000	1763.9	1775.7	1776.3	2.0	6.4	2.1	5.6
106.76	11000	1764.5	1776.5	1777.5	2.0	9.1	2.0	5.8
106.9	11000	1764.7	1778.2	1779.1	2.9	9.0	2.1	5.4
106.93	11000	1765.4	1779.0	1779.5	2.7	5.9	1.0	4.8
106.935	Bridge							
106.94	11000	1766.1	1779.5	1779.9	2.7	5.5	1.0	4.5
107.01	11000	1770.6	1780.2	1780.6	3.2	6.6	1.7	3.8
105.99	11600	1757.34	1768.1	1768.8	1.4	7.5	2.4	5.6
106.13	11600	1756.85	1769.4	1770.3	1.8	8.0	1.4	6.0
106.35	11600	1760.5	1771.4	1772.2	2.5	7.5	1.1	5.4
106.6	11600	1762.9	1773.3	1773.9	1.6	7.2	2.2	4.5
106.65	11600	1764.2	1775.8	1776.3	2.1	6.3	2.1	5.3
106.67	11600	1763.9	1776.0	1776.6	2.1	6.5	2.1	5.7
106.76	11600	1764.5	1776.7	1777.8	2.1	9.2	2.0	5.8
106.9	11600	1764.7	1778.5	1779.4	2.9	9.2	2.1	5.4
106.93	11600	1765.4	1779.3	1779.8	2.7	6.0	1.0	4.9
106.935	Bridge							
106.94	11600	1766.1	1779.9	1780.3	2.7	5.6	1.0	4.5
107.01	11600	1770.6	1780.5	1780.9	3.2	6.7	1.7	3.8
105.99	11700	1757.34	1768.1	1768.9	1.4	7.5	2.4	5.6
106.13	11700	1756.85	1769.5	1770.4	1.8	8.0	1.4	6.1
106.35	11700	1760.5	1771.4	1772.2	2.5	7.5	1.2	5.3
106.6	11700	1762.9	1773.4	1774.0	1.6	7.2	2.3	4.6
106.65	11700	1764.2	1775.8	1776.4	2.2	6.3	2.1	5.3
106.67	11700	1763.9	1776.0	1776.6	2.1	6.6	2.1	5.7
106.76	11700	1764.5	1776.8	1777.9	2.1	9.2	2.0	5.8
106.9	11700	1764.7	1778.5	1779.5	2.8	9.3	2.1	5.4
106.93	11700	1765.4	1779.3	1779.8	2.8	6.0	1.0	4.9
106.935	Bridge							
106.94	11700	1766.1	1780.0	1780.4	2.7	5.6	1.0	4.5
107.01	11700	1770.6	1780.5	1781.0	3.2	6.7	1.7	3.8

January 1, 1997 Flood Flow (McBain)

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Table A-1. Salt Flat Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
105.99	12900	1757.34	1768.6	1769.5	1.5	7.8	2.5	5.7	
106.13	12900	1756.85	1770.0	1771.0	1.9	8.4	1.5	6.2	
106.35	12900	1760.5	1772.1	1772.9	2.5	7.4	1.4	5.1	
106.6	12900	1762.9	1773.9	1774.5	1.6	7.3	2.4	4.6	
106.65	12900	1764.2	1776.3	1776.9	2.3	6.5	2.2	5.4	Annual: Q100 w/ ROD (11,000 cfs) Release
106.67	12900	1763.9	1776.5	1777.2	2.1	6.7	2.2	5.8	
106.76	12900	1764.5	1777.3	1778.4	2.2	9.6	2.1	5.9	
106.9	12900	1764.7	1779.0	1780.0	2.8	9.6	2.2	5.3	
106.93	12900	1765.4	1779.8	1780.4	2.9	6.3	1.0	5.1	
106.935	Bridge								
106.94	12900	1766.1	1780.4	1780.9	2.9	5.9	1.0	4.8	
107.01	12900	1770.6	1781.0	1781.4	3.3	6.9	1.8	3.9	
105.99	14700	1757.34	1769.4	1770.3	1.6	8.2	2.7	5.9	
106.13	14700	1756.85	1770.6	1771.8	2.0	9.0	1.3	6.4	
106.35	14700	1760.5	1772.9	1773.7	2.6	7.5	1.6	5.0	
106.6	14700	1762.9	1774.5	1775.2	1.7	7.6	2.6	4.7	
106.65	14700	1764.2	1777.0	1777.6	2.4	6.8	2.4	5.6	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
106.67	14700	1763.9	1777.2	1777.9	2.2	7.1	2.4	6.0	
106.76	14700	1764.5	1777.9	1779.2	2.3	10.0	2.2	5.9	
106.9	14700	1764.7	1779.8	1780.8	2.9	9.7	2.2	5.2	
106.93	14700	1765.4	1780.5	1781.1	3.2	6.8	1.0	5.5	
106.935	Bridge								
106.94	14700	1766.1	1781.1	1781.5	2.3	6.2	0.7	4.4	
107.01	14700	1770.6	1781.6	1782.1	3.4	7.3	1.9	4.1	
105.99	14900	1757.34	1769.5	1770.4	1.6	8.2	2.7	5.9	
106.13	14900	1756.85	1770.7	1771.9	2.0	9.0	1.4	6.5	
106.35	14900	1760.5	1773.0	1773.7	2.6	7.6	1.7	5.0	
106.6	14900	1762.9	1774.6	1775.3	1.7	7.6	2.6	4.8	
106.65	14900	1764.2	1777.1	1777.7	2.4	6.8	2.4	5.6	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
106.67	14900	1763.9	1777.2	1778.0	2.2	7.1	2.4	6.0	
106.76	14900	1764.5	1778.0	1779.3	2.3	10.0	2.3	5.9	
106.9	14900	1764.7	1779.9	1780.8	2.9	9.8	2.2	5.2	
106.93	14900	1765.4	1780.6	1781.2	3.2	6.8	1.1	5.5	
106.935	Bridge								
106.94	14900	1766.1	1781.1	1781.6	2.3	6.2	0.7	4.4	
107.01	14900	1770.6	1781.7	1782.2	3.4	7.3	2.0	4.1	

Table A-2. Salt Flat Bridge: No Action Alternative
Bridge Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

January 1, 1997 Flood Flow (McBain)

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 11000	Opening: Single BR
E.G. US. (ft)	1779.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.5	E.G. Elev (ft)	1779.9	1779.5
Q Total (cfs)	11000	W.S. Elev (ft)	1778	1778
Q Bridge (cfs)	11000	Crit W.S. (ft)	1774.1	1773.8
Q Weir (cfs)		Max Chl Dpth (ft)	11.8	12.6
Weir Sta Lft (ft)		Vel Total (ft/s)	6.1	6.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	1794.5	1787.3
Weir Submerg		Froude # Chl	0.03	0.03
Weir Max Depth (ft)		Specif Force (cu ft)	10453.8	10706.1
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)	1837518	
Min El Prs (ft)	1778	W.P. Total (ft)	548.2	534.1
Delta EG (ft)	0.5	Conv. Total (cfs)	141840	149773.5
Delta WS (ft)	0.5	Top Width (ft)		
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.2	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.2	1.1
Br Sel Method	Press Only	Power Total (lb/ft s)	7.5	6.9

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 11600	Opening: Single BR
E.G. US. (ft)	1780.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.9	E.G. Elev (ft)	1780.3	1779.8
Q Total (cfs)	11600	W.S. Elev (ft)	1778.0	1778.0
Q Bridge (cfs)	11600	Crit W.S. (ft)	1774.3	1774.0
Q Weir (cfs)		Max Chl Dpth (ft)	11.8	12.6
Weir Sta Lft (ft)		Vel Total (ft/s)	6.5	6.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	1794.5	1787.3
Weir Submerg		Froude # Chl	0.03	0.03
Weir Max Depth (ft)		Specif Force (cu ft)	10702.9	10957.9
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)	1837518	
Min El Prs (ft)	1778	W.P. Total (ft)	548.2	534.1
Delta EG (ft)	0.5	Conv. Total (cfs)	141840	149773.5
Delta WS (ft)	0.6	Top Width (ft)		
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.5	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.4	1.3
Br Sel Method	Press Only	Power Total (lb/ft s)	8.8	8.1

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release
Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 11700	Opening: Single BR
E.G. US. (ft)	1780.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1780.0	E.G. Elev (ft)	1780.4	1779.8
Q Total (cfs)	11700	W.S. Elev (ft)	1778.0	1778.0
Q Bridge (cfs)	11700	Crit W.S. (ft)	1774.4	1774.0
Q Weir (cfs)		Max Chl Dpth (ft)	11.8	12.6
Weir Sta Lft (ft)		Vel Total (ft/s)	6.5	6.6
Weir Sta Rgt (ft)		Flow Area (sq ft)	1794.5	1787.3
Weir Submerg		Froude # Chl	0.03	0.03
Weir Max Depth (ft)		Specif Force (cu ft)	10745.7	11001.2
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)	1837518	
Min El Prs (ft)	1778	W.P. Total (ft)	548.2	534.1
Delta EG (ft)	0.6	Conv. Total (cfs)	141840	149773.5
Delta WS (ft)	0.6	Top Width (ft)		
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.6	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.4	1.3
Br Sel Method	Press Only	Power Total (lb/ft s)	9.1	8.4

Table A-2. Salt Flat Bridge: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge: As-Built Piers, Abutments, and Superstructure

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 12900	Opening: Single BR
E.G. US. (ft)	1780.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1780.4	E.G. Elev (ft)	1780.9	1780.9
Q Total (cfs)	12900	W.S. Elev (ft)	1780.4	1780.4
Q Bridge (cfs)	11739.2	Crit W.S. (ft)	1774.7	1774.5
Q Weir (cfs)	1160.8	Max Chl Dpth (ft)	14.3	15.0
Weir Sta Lft (ft)	1578.13	Vel Total (ft/s)	7.2	7.2
Weir Sta Rgt (ft)	2222.74	Flow Area (sq ft)	1794.5	1787.3
Weir Submerg	0.15	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	1.8	Specif Force (cu ft)	15620.2	15862.0
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)		
Min El Prs (ft)	1778	W.P. Total (ft)	548.2	534.1
Delta EG (ft)	0.5	Conv. Total (cfs)		
Delta WS (ft)	0.6	Top Width (ft)		
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.6	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 14700	Opening: Single BR
E.G. US. (ft)	1781.5	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1781.1	E.G. Elev (ft)	1781.6	1781.6
Q Total (cfs)	14700.0	W.S. Elev (ft)	1781.1	1781.1
Q Bridge (cfs)	11852.9	Crit W.S. (ft)	1775.3	1775.2
Q Weir (cfs)	2847.2	Max Chl Dpth (ft)	14.9	15.7
Weir Sta Lft (ft)	1569.37	Vel Total (ft/s)	6.2	6.4
Weir Sta Rgt (ft)	2262.96	Flow Area (sq ft)	2371.5	2303.2
Weir Submerg	0.32	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	2.5	Specif Force (cu ft)	17344.2	17594.1
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)	3.6	3.7
Min El Prs (ft)	1778	W.P. Total (ft)	1203.9	1152.5
Delta EG (ft)	0.5	Conv. Total (cfs)		
Delta WS (ft)	0.6	Top Width (ft)	660.39	623.24
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.6	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0902Final	Trinity River	Salt Flat RS: 106.935	Profile: 14900	Opening: Single BR
E.G. US. (ft)	1781.6	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1781.1	E.G. Elev (ft)	1781.6	1781.6
Q Total (cfs)	14900.0	W.S. Elev (ft)	1781.1	1781.1
Q Bridge (cfs)	11861.3	Crit W.S. (ft)	1775.3	1775.2
Q Weir (cfs)	3038.7	Max Chl Dpth (ft)	15.0	15.7
Weir Sta Lft (ft)	1568.58	Vel Total (ft/s)	6.2	6.4
Weir Sta Rgt (ft)	2263.02	Flow Area (sq ft)	2408.2	2337.7
Weir Submerg	0.33	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	2.5	Specif Force (cu ft)	17519.0	17768.3
Min El Weir Flow (ft)	1780.61	Hydr Depth (ft)	3.6	3.7
Min El Prs (ft)	1778	W.P. Total (ft)	1208.1	1154.3
Delta EG (ft)	0.4	Conv. Total (cfs)		
Delta WS (ft)	0.6	Top Width (ft)	664.63	624.95
BR Open Area (sq ft)	1787.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.6	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-3. Salt Flat Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridge: Two Span, 280 ft Openning, Single 4 ft Dia. Column

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
105.99	11000	1757.34	1767.8	1768.6	1.3	7.4	2.3	5.5
106.13	11000	1756.85	1769.1	1770.0	1.7	7.8	1.3	5.9
106.35	11000	1760.5	1771.1	1771.9	2.4	7.5	1.0	5.5
106.6	11000	1762.9	1773.1	1773.7	1.5	7.1	2.2	4.5
106.65	11000	1764.2	1775.5	1776.1	2.1	6.2	2.0	5.2
106.67	11000	1763.9	1775.7	1776.3	2.0	6.4	2.1	5.6
106.76	11000	1764.5	1776.5	1777.5	2.0	9.1	2.0	5.8
106.9	11000	1764.7	1778.2	1779.1	2.9	9.0	2.1	5.4
106.93	11000	1765.4	1779.0	1779.5	2.7	5.9	1.0	4.8
106.935	Bridge							
106.94	11000	1766.1	1779.0	1779.5	2.8	5.8	1.0	4.7
107.01	11000	1770.6	1779.8	1780.3	3.4	7.0	1.8	4.1
105.99	11600	1757.34	1768.1	1768.8	1.4	7.5	2.4	5.6
106.13	11600	1756.85	1769.4	1770.3	1.8	8.0	1.4	6.0
106.35	11600	1760.5	1771.4	1772.1	2.5	7.5	1.1	5.4
106.6	11600	1762.9	1773.3	1773.9	1.6	7.2	2.2	4.5
106.65	11600	1764.2	1775.8	1776.3	2.1	6.3	2.1	5.3
106.67	11600	1763.9	1775.9	1776.6	2.1	6.5	2.1	5.7
106.76	11600	1764.5	1776.7	1777.8	2.1	9.3	2.0	5.9
106.9	11600	1764.7	1778.5	1779.4	2.9	9.2	2.1	5.4
106.93	11600	1765.4	1779.3	1779.8	2.7	6.0	1.0	4.9
106.935	Bridge							
106.94	11600	1766.1	1779.3	1779.8	2.9	5.9	1.1	4.8
107.01	11600	1770.6	1780.1	1780.6	3.4	7.1	1.8	4.1
105.99	11700	1757.34	1768.1	1768.9	1.4	7.5	2.4	5.6
106.13	11700	1756.85	1769.4	1770.4	1.8	8.0	1.4	6.1
106.35	11700	1760.5	1771.4	1772.2	2.5	7.5	1.2	5.4
106.6	11700	1762.9	1773.3	1774.0	1.6	7.2	2.3	4.6
106.65	11700	1764.2	1775.8	1776.4	2.2	6.3	2.1	5.3
106.67	11700	1763.9	1776.0	1776.6	2.1	6.6	2.1	5.7
106.76	11700	1764.5	1776.8	1777.9	2.1	9.2	2.0	5.8
106.9	11700	1764.7	1778.5	1779.5	2.8	9.3	2.1	5.4
106.93	11700	1765.4	1779.3	1779.8	2.8	6.0	1.0	4.9
106.935	Bridge							
106.94	11700	1766.1	1779.4	1779.9	2.9	5.9	1.1	4.8
107.01	11700	1770.6	1780.2	1780.7	3.4	7.1	1.8	4.1

January 1, 1997 Flood Flow (McBain)

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Table A-3. Salt Flat Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridge: Two Span, 280 ft Openning, Single 4 ft Dia. Column

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
105.99	12900	1757.34	1768.6	1769.5	1.5	7.8	2.5	5.7	
106.13	12900	1756.85	1769.9	1771.0	1.9	8.4	1.5	6.2	
106.35	12900	1760.5	1772.1	1772.9	2.5	7.4	1.4	5.1	
106.6	12900	1762.9	1773.9	1774.5	1.6	7.3	2.4	4.6	
106.65	12900	1764.2	1776.3	1776.9	2.3	6.5	2.2	5.4	Annual: Q100 w/ ROD (11,000 cfs) Release
106.67	12900	1763.9	1776.5	1777.2	2.1	6.7	2.2	5.8	
106.76	12900	1764.5	1777.3	1778.4	2.2	9.6	2.1	5.9	
106.9	12900	1764.7	1779.0	1780.0	2.8	9.6	2.2	5.3	
106.93	12900	1765.4	1779.8	1780.4	2.9	6.3	1.0	5.1	
106.935	Bridge								
106.94	12900	1766.1	1779.9	1780.4	3.0	6.2	1.1	5.0	
107.01	12900	1770.6	1780.6	1781.1	3.5	7.3	1.9	4.2	
105.99	14700	1757.34	1769.4	1770.3	1.6	8.2	2.7	5.9	
106.13	14700	1756.85	1770.6	1771.8	2.0	9.0	1.3	6.4	
106.35	14700	1760.5	1772.9	1773.7	2.6	7.5	1.6	5.0	
106.6	14700	1762.9	1774.5	1775.2	1.7	7.6	2.6	4.8	
106.65	14700	1764.2	1777.0	1777.6	2.4	6.8	2.4	5.6	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
106.67	14700	1763.9	1777.2	1777.9	2.2	7.1	2.4	6.0	
106.76	14700	1764.5	1777.9	1779.2	2.3	10.0	2.2	5.9	
106.9	14700	1764.7	1779.8	1780.8	2.9	9.7	2.2	5.2	
106.93	14700	1765.4	1780.5	1781.1	3.2	6.8	1.0	5.5	
106.935	Bridge								
106.94	14700	1766.1	1780.6	1781.1	2.6	6.6	1.0	4.8	
107.01	14700	1770.6	1781.2	1781.8	3.6	7.6	2.0	4.3	
105.99	14900	1757.34	1769.5	1770.4	1.6	8.2	2.7	5.9	
106.13	14900	1756.85	1770.7	1771.9	2.0	9.0	1.4	6.4	
106.35	14900	1760.5	1773.0	1773.7	2.6	7.6	1.7	5.0	
106.6	14900	1762.9	1774.6	1775.3	1.7	7.6	2.6	4.8	
106.65	14900	1764.2	1777.1	1777.7	2.4	6.8	2.4	5.6	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
106.67	14900	1763.9	1777.2	1778.0	2.2	7.1	2.4	6.0	
106.76	14900	1764.5	1778.0	1779.2	2.3	10.0	2.3	5.9	
106.9	14900	1764.7	1779.9	1780.8	2.9	9.8	2.2	5.2	
106.93	14900	1765.4	1780.6	1781.2	3.2	6.8	1.1	5.5	
106.935	Bridge								
106.94	14900	1766.1	1780.6	1781.2	2.6	6.6	0.9	4.8	
107.01	14900	1770.6	1781.3	1781.9	3.6	7.7	2.0	4.3	

Table A-4. Salt Flat Bridge: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridge: Two Span, 280 ft Openning, Single 4 ft Dia. Column

January 1, 1997 Flood Flow (McBain)

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 11000	Opening: Single BR
E.G. US. (ft)	1779.5	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.0	E.G. Elev (ft)	1779.5	1779.5
Q Total (cfs)	11000	W.S. Elev (ft)	1779.0	1779.0
Q Bridge (cfs)	11000	Crit W.S. (ft)	1773.7	1773.5
Q Weir (cfs)		Max Chl Dpth (ft)	12.9	13.6
Weir Sta Lft (ft)		Vel Total (ft/s)	5.0	5.1
Weir Sta Rgt (ft)		Flow Area (sq ft)	2204.8	2176.3
Weir Submerg		Froude # Chl	0.3	0.3
Weir Max Depth (ft)		Specif Force (cu ft)	12695.1	12859.3
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	8.6	8.6
Min El Prs (ft)	1790	W.P. Total (ft)	295.9	292.2
Delta EG (ft)	0.0	Conv. Total (cfs)	290147.9	302573.9
Delta WS (ft)	0.0	Top Width (ft)	256.62	251.82
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.01	0
BR Open Vel (ft/s)	5.1	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.7	0.6
Br Sel Method	Energy only	Power Total (lb/ft s)	3.3	3.1

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 11600	Opening: Single BR
E.G. US. (ft)	1779.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.3	E.G. Elev (ft)	1779.8	1779.8
Q Total (cfs)	11600	W.S. Elev (ft)	1779.3	1779.3
Q Bridge (cfs)	11600	Crit W.S. (ft)	1773.9	1773.7
Q Weir (cfs)		Max Chl Dpth (ft)	13.2	13.9
Weir Sta Lft (ft)		Vel Total (ft/s)	5.1	5.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	2276.3	2246.0
Weir Submerg		Froude # Chl	0.3	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	13455.4	13611.0
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	8.9	8.9
Min El Prs (ft)	1790	W.P. Total (ft)	297.4	294.0
Delta EG (ft)	0.0	Conv. Total (cfs)	303189.8	315701.6
Delta WS (ft)	0.0	Top Width (ft)	257.24	252.84
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.01	0
BR Open Vel (ft/s)	5.2	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.7	0.6
Br Sel Method	Energy only	Power Total (lb/ft s)	3.6	3.3

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 11700	Opening: Single BR
E.G. US. (ft)	1779.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.4	E.G. Elev (ft)	1779.8	1779.8
Q Total (cfs)	11700	W.S. Elev (ft)	1779.4	1779.3
Q Bridge (cfs)	11700	Crit W.S. (ft)	1774.0	1773.7
Q Weir (cfs)		Max Chl Dpth (ft)	13.3	13.9
Weir Sta Lft (ft)		Vel Total (ft/s)	5.1	5.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	2294.6	2264.0
Weir Submerg		Froude # Chl	0.3	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	13634.8	13789.0
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	8.9	9.0
Min El Prs (ft)	1790	W.P. Total (ft)	297.8	294.5
Delta EG (ft)	0.0	Conv. Total (cfs)	306552.1	319115.3
Delta WS (ft)	0.0	Top Width (ft)	257.39	253.1
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.01	0
BR Open Vel (ft/s)	5.2	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.7	0.7
Br Sel Method	Energy only	Power Total (lb/ft s)	3.6	3.3

Table A-4. Salt Flat Bridge: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridge: Two Span, 280 ft Openning, Single 4 ft Dia. Column

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 12900	Opening: Single BR
E.G. US. (ft)	1780.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1779.9	E.G. Elev (ft)	1780.4	1780.4
Q Total (cfs)	12900	W.S. Elev (ft)	1779.9	1779.8
Q Bridge (cfs)	12900	Crit W.S. (ft)	1774.5	1774.2
Q Weir (cfs)		Max Chl Dpth (ft)	13.8	14.4
Weir Sta Lft (ft)		Vel Total (ft/s)	5.3	5.4
Weir Sta Rgt (ft)		Flow Area (sq ft)	2422.9	2389.4
Weir Submerg		Froude # Chl	0.31	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	15100.1	15236.9
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	9.4	9.4
Min El Prs (ft)	1790	W.P. Total (ft)	300.5	297.9
Delta EG (ft)	0.0	Conv. Total (cfs)	330561.3	343249.3
Delta WS (ft)	0.0	Top Width (ft)	258.48	254.91
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.02	0
BR Open Vel (ft/s)	5.4	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.8	0.7
Br Sel Method	Energy only	Power Total (lb/ft s)	4.1	3.8

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 14700	Opening: Single BR
E.G. US. (ft)	1781.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1780.6	E.G. Elev (ft)	1781.1	1781.1
Q Total (cfs)	14700	W.S. Elev (ft)	1780.5	1780.5
Q Bridge (cfs)	14700	Crit W.S. (ft)	1775.0	1774.9
Q Weir (cfs)		Max Chl Dpth (ft)	14.4	15.1
Weir Sta Lft (ft)		Vel Total (ft/s)	5.7	5.8
Weir Sta Rgt (ft)		Flow Area (sq ft)	2597.5	2558.3
Weir Submerg		Froude # Chl	0.32	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	17233.8	17348.1
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	9.4	9.8
Min El Prs (ft)	1790	W.P. Total (ft)	320.1	306.1
Delta EG (ft)	0.0	Conv. Total (cfs)	362849.9	376276.3
Delta WS (ft)	0.1	Top Width (ft)	276	261.14
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.02	0
BR Open Vel (ft/s)	5.8	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.8	0.8
Br Sel Method	Energy only	Power Total (lb/ft s)	4.7	4.6

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 092402BrDes	Trinity River	Salt Flat RS: 106.935	Profile: 14900	Opening: Single BR
E.G. US. (ft)	1781.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1780.6	E.G. Elev (ft)	1781.2	1781.2
Q Total (cfs)	14900	W.S. Elev (ft)	1780.6	1780.6
Q Bridge (cfs)	14900	Crit W.S. (ft)	1775.0	1774.9
Q Weir (cfs)		Max Chl Dpth (ft)	14.5	15.2
Weir Sta Lft (ft)		Vel Total (ft/s)	5.7	5.8
Weir Sta Rgt (ft)		Flow Area (sq ft)	2614.5	2574.0
Weir Submerg		Froude # Chl	0.32	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	17450.5	17559.9
Min El Weir Flow (ft)	1793.01	Hydr Depth (ft)	9.5	9.8
Min El Prs (ft)	1790	W.P. Total (ft)	320.3	307.3
Delta EG (ft)	0.0	Conv. Total (cfs)	366026.4	379318.0
Delta WS (ft)	0.1	Top Width (ft)	276	262.14
BR Open Area (sq ft)	5180.9	Frctn Loss (ft)	0.02	0
BR Open Vel (ft/s)	5.8	C & E Loss (ft)	0	0
Coef of Q		Shear Total (lb/sq ft)	0.8	0.8
Br Sel Method	Energy only	Power Total (lb/ft s)	4.8	4.7

Table A-5. Bucktail Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11000	1734.11	1746.9	1747.5	1.8	7.2	1.4	4.3
104.11	11000	1737.35	1748.2	1749.0	1.4	7.5	1.3	5.2
104.43	11000	1738.02	1750.3	1751.1	1.2	7.5	1.3	6.6
104.48	11000	1738.14	1750.5	1751.4	1.2	7.8	1.2	6.8
104.68	11000	1738.4	1752.2	1752.9	1.2	7.4	1.6	4.2
104.77	11000	1739.7	1753.0	1753.7	1.4	7.5	2.7	5.7
104.82	11000	1739.4	1753.6	1754.5	1.8	8.8	2.9	5.1
104.83	11000	1740.7	1754.1	1754.7	1.8	7.2	2.5	3.9
104.90	11000	1742.8	1754.7	1755.6	1.9	8.7	2.7	5.3
104.94	11000	1740.7	1755.6	1756.0	1.1	5.5	1.2	4.6
105.01	11000	1742.5	1755.7	1756.7	1.6	8.8	1.9	5.7
105.03	11000	1739.3	1755.9	1757.3	2.1	10.4	2.5	6.6
105.035	Mult Open							
105.04	11000	1740	1756.3	1758.4	0.6	11.7	2.3	10.6
105.07	11000	1745.2	1758.4	1758.8	1.1	5.8	1.5	3.3
105.08	11000	1745.2	1758.4	1758.9	0.8	5.5	1.7	4.6
105.14	11000	1745.7	1758.9	1759.2		5.4	2.9	4.0
105.17	11000	1746.5	1758.8	1759.4	1.1	6.9	1.9	4.1
103.90	11600	1734.11	1747.2	1747.9	1.9	7.4	1.5	4.4
104.11	11600	1737.35	1748.5	1749.3	1.4	7.6	1.4	5.2
104.43	11600	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11600	1738.14	1750.8	1751.8	1.3	8.0	1.2	7.0
104.68	11600	1738.4	1752.5	1753.3	1.2	7.5	1.6	4.1
104.77	11600	1739.7	1753.3	1754.1	1.5	7.6	2.7	5.7
104.82	11600	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11600	1740.7	1754.5	1755.0	1.8	7.3	2.5	3.9
104.90	11600	1742.8	1755.0	1755.9	2.0	8.7	2.8	5.3
104.94	11600	1740.7	1755.9	1756.3	1.2	5.6	1.3	4.7
105.01	11600	1742.5	1756.0	1757.0	1.6	8.9	1.9	5.7
105.03	11600	1739.3	1756.2	1757.6	2.2	10.7	2.5	6.6
105.035	Mult Open							
105.04	11600	1740	1756.7	1758.8	0.6	11.9	2.0	10.3
105.07	11600	1745.2	1758.9	1759.3	1.1	5.8	1.5	3.2
105.08	11600	1745.2	1758.9	1759.3	0.9	5.5	1.1	4.0
105.14	11600	1745.7	1759.3	1759.6		5.4	2.9	3.9
105.17	11600	1746.5	1759.2	1759.8	1.1	6.9	1.9	4.1

January 1, 1997 Flood Flow (McBain)

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Table A-5. Bucktail Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11700	1734.11	1747.3	1747.9	1.9	7.4	1.5	4.4
104.11	11700	1737.35	1748.5	1749.4	1.4	7.6	1.4	5.2
104.43	11700	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11700	1738.14	1750.9	1751.8	1.3	8.1	1.2	7.0
104.68	11700	1738.4	1752.6	1753.3	1.2	7.5	1.6	4.1
104.77	11700	1739.7	1753.4	1754.2	1.5	7.6	2.7	5.7
104.82	11700	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11700	1740.7	1754.5	1755.1	1.8	7.3	2.5	3.9
104.90	11700	1742.8	1755.1	1756.0	2.0	8.8	2.8	5.3
104.94	11700	1740.7	1755.9	1756.4	1.2	5.6	1.3	4.7
105.01	11700	1742.5	1756.0	1757.1	1.6	8.9	1.9	5.7
105.03	11700	1739.3	1756.2	1757.7	2.2	10.7	2.5	6.6
105.035	Mult Open							
105.04	11700	1740	1756.7	1758.9	0.6	11.9	2.0	10.2
105.07	11700	1745.2	1758.9	1759.3	1.1	5.7	1.6	3.2
105.08	11700	1745.2	1758.9	1759.4	0.9	5.5	1.1	4.0
105.14	11700	1745.7	1759.4	1759.7		5.4	2.9	3.9
105.17	11700	1746.5	1759.3	1759.9	1.1	7.0	1.9	4.1
103.90	13100	1734.11	1748.0	1748.7	2.0	7.7	1.6	4.5
104.11	13100	1737.35	1749.3	1750.1	1.5	7.8	1.5	5.2
104.43	13100	1738.02	1751.3	1752.3	1.4	8.1	1.4	7.1
104.48	13100	1738.14	1751.5	1752.6	1.4	8.5	1.3	7.3
104.68	13100	1738.4	1753.4	1754.1	1.4	7.7	1.7	4.1
104.77	13100	1739.7	1754.1	1754.9	1.6	7.8	2.8	5.7
104.82	13100	1739.4	1754.7	1755.7	1.9	9.2	3.1	5.0
104.83	13100	1740.7	1755.2	1755.8	1.9	7.5	2.6	3.9
104.90	13100	1742.8	1755.8	1756.7	2.2	9.1	2.7	5.3
104.94	13100	1740.7	1756.6	1757.1	1.3	6.0	1.4	4.9
105.01	13100	1742.5	1756.8	1757.8	1.7	9.1	2.1	5.5
105.03	13100	1739.3	1756.9	1758.4	2.3	11.0	2.7	6.6
105.035	Mult Open							
105.04	13100	1740	1757.5	1759.8	0.6	12.3	2.1	9.6
105.07	13100	1745.2	1759.9	1760.2	1.1	5.7	1.6	3.0
105.08	13100	1745.2	1759.8	1760.3	1.0	5.6	1.0	3.6
105.14	13100	1745.7	1760.2	1760.5		5.4	2.8	3.9
105.17	13100	1746.5	1760.1	1760.7	1.2	7.2	2.0	4.2

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-5. Bucktail Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
103.90	14700	1734.11	1748.8	1749.6	2.1	8.0	1.8	4.6	
104.11	14700	1737.35	1750.1	1750.9	1.1	7.8	1.6	4.6	
104.43	14700	1738.02	1752.0	1753.1	1.4	8.5	1.4	7.4	
104.48	14700	1738.14	1752.2	1753.5	1.5	9.0	1.4	7.7	
104.68	14700	1738.4	1754.3	1755.0	1.5	7.9	1.8	4.1	
104.77	14700	1739.7	1754.9	1755.8	1.6	8.1	2.9	5.8	
104.82	14700	1739.4	1755.5	1756.5	2.1	9.3	3.2	5.0	
104.83	14700	1740.7	1756.1	1756.6	2.1	7.6	2.7	4.0	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
104.90	14700	1742.8	1756.5	1757.5	2.4	9.3	2.7	5.3	
104.94	14700	1740.7	1757.3	1757.9	1.4	6.4	1.5	5.1	
105.01	14700	1742.5	1757.6	1758.6	1.7	9.2	2.3	5.5	
105.03	14700	1739.3	1757.7	1759.2	2.3	11.3	2.9	6.6	
105.035	Mult Open								
105.04	14700	1740	1758.6	1760.8	0.6	12.3	2.3	8.7	
105.07	14700	1745.2	1760.9	1761.2	1.1	5.7	1.5	2.8	
105.08	14700	1745.2	1760.8	1761.2	1.0	5.5	1.1	3.3	
105.14	14700	1745.7	1761.2	1761.5		5.5	2.7	3.8	
105.17	14700	1746.5	1761.0	1761.7	1.2	7.4	2.0	4.2	
103.90	15000	1734.11	1748.9	1749.7	2.1	8.0	1.8	4.7	
104.11	15000	1737.35	1750.3	1751.1	1.2	7.8	1.6	4.5	
104.43	15000	1738.02	1752.2	1753.3	1.5	8.6	1.4	7.4	
104.48	15000	1738.14	1752.4	1753.6	1.5	9.1	1.4	7.7	
104.68	15000	1738.4	1754.4	1755.2	1.5	7.9	1.8	4.1	
104.77	15000	1739.7	1755.1	1755.9	1.6	8.1	2.9	5.8	
104.82	15000	1739.4	1755.6	1756.6	2.1	9.3	3.2	5.0	
104.83	15000	1740.7	1756.2	1756.8	2.1	7.6	2.7	4.0	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
104.90	15000	1742.8	1756.7	1757.7	2.4	9.3	2.7	5.3	
104.94	15000	1740.7	1757.5	1758.1	1.4	6.4	1.6	5.2	
105.01	15000	1742.5	1757.7	1758.7	1.8	9.2	2.3	5.5	
105.03	15000	1739.3	1757.8	1759.4	2.3	11.4	3.0	6.6	
105.035	Mult Open								
105.04	15000	1740	1758.8	1761.0	0.6	12.3	2.3	8.5	
105.07	15000	1745.2	1761.0	1761.4	1.1	5.6	1.5	2.7	
105.08	15000	1745.2	1761.0	1761.4	1.0	5.5	1.1	3.2	
105.14	15000	1745.7	1761.3	1761.6		5.5	2.7	3.8	
105.17	15000	1746.5	1761.2	1761.9	1.2	7.4	2.1	4.2	

Table A-6. Bucktail Bridge: No Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

BRIDGE

January 1, 1997 Flood Flow (McBain)

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11000	Opening: Bridge #1
E.G. US. (ft)	1757.7	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.1	E.G. Elev (ft)	1757.6	1757.3
Q Total (cfs)	10955.6	W.S. Elev (ft)	1754.8	1754.3
Q Bridge (cfs)	10955.6	Crit W.S. (ft)	1752.3	1751.9
Q Weir (cfs)		Max Chl Dpth (ft)	14.8	15.0
Weir Sta Lft (ft)		Vel Total (ft/s)	13.4	13.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	820.2	814.7
Weir Submerg		Froude # Chl	0.7	0.71
Weir Max Depth (ft)		Specif Force (cu ft)	9517.8	9808.4
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	11.4	11.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.4	86.1
Delta EG (ft)	0.4	Conv. Total (cfs)	126010.8	129837.5
Delta WS (ft)	0.9	Top Width (ft)	72	71.85
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.23	0.05
BR Open Vel (ft/s)	13.5	C & E Loss (ft)	0.02	0.01
Coef of Q		Shear Total (lb/sq ft)	4.4	4.2
Br Sel Method	Energy only	Power Total (lb/ft s)	59.2	56.6

CULVERT

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11000	Culvert ID: 30" CMP
Culv Q (cfs)	13.6	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.8	
Q Barrel (cfs)	13.6	Culv Vel DS (ft/s)	2.8	
E.G. US. (ft)	1757.7	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1757.7	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.3	Culv Frctn Ls (ft)	0.16	
W.S. DS (ft)	1757.3	Culv Ext Lss (ft)	0.12	
Delta EG (ft)	0.4	Culv Ent Lss (ft)	0.11	
Delta WS (ft)	0.4	Q Weir (cfs)	30.8	
E.G. IC (ft)	1754.4	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1757.7	Weir Sta Rgt (ft)	1466.4	
Culvert Control	Outlet	Weir Submerg	0.43	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	1.5	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	0.6	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	12.8	
Culv Crt Depth (ft)	1.2	Min El Weir Flow (ft)	1756.11	

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11600	Opening: Bridge #1
E.G. US. (ft)	1758.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.3	E.G. Elev (ft)	1758.0	1757.7
Q Total (cfs)	11528.1	W.S. Elev (ft)	1754.9	1754.4
Q Bridge (cfs)	11528.1	Crit W.S. (ft)	1752.6	1752.2
Q Weir (cfs)		Max Chl Dpth (ft)	14.9	15.1
Weir Sta Lft (ft)		Vel Total (ft/s)	13.9	14.0
Weir Sta Rgt (ft)		Flow Area (sq ft)	832.6	821.7
Weir Submerg		Froude # Chl	0.72	0.74
Weir Max Depth (ft)		Specif Force (cu ft)	10077.6	10354.5
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	11.6	11.4
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.7	86.3
Delta EG (ft)	0.4	Conv. Total (cfs)	128977.3	131600.6
Delta WS (ft)	1.1	Top Width (ft)	72	71.86
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.25	0.05
BR Open Vel (ft/s)	14.0	C & E Loss (ft)	0.03	0.01
Coef of Q		Shear Total (lb/sq ft)	4.7	4.6
Br Sel Method	Energy only	Power Total (lb/ft s)	65.5	64.0

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11600	Culvert ID: 30" CMP
Culv Q (cfs)	13.4	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.7	
Q Barrel (cfs)	13.4	Culv Vel DS (ft/s)	2.7	
E.G. US. (ft)	1758.0	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1758.0	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.6	Culv Frctn Ls (ft)	0.16	
W.S. DS (ft)	1757.6	Culv Ext Lss (ft)	0.12	
Delta EG (ft)	0.4	Culv Ent Lss (ft)	0.1	
Delta WS (ft)	0.4	Q Weir (cfs)	58.5	
E.G. IC (ft)	1757.6	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1758.0	Weir Sta Rgt (ft)	1466.4	
Culvert Control	Outlet	Weir Submerg	0.62	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	1.9	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	0.9	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	20.6	
Culv Crt Depth (ft)	1.2	Min El Weir Flow (ft)	1756.11	

Table A-6. Bucktail Bridge: No Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

BRIDGE

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release
Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11700	Opening: Bridge #1
E.G. US. (ft)	1758.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.4	E.G. Elev (ft)	1758.0	1757.7
Q Total (cfs)	11617.4	W.S. Elev (ft)	1754.9	1754.4
Q Bridge (cfs)	11617.4	Crit W.S. (ft)	1752.7	1752.2
Q Weir (cfs)		Max Chl Dpth (ft)	14.9	15.1
Weir Sta Lft (ft)		Vel Total (ft/s)	13.9	14.1
Weir Sta Rgt (ft)		Flow Area (sq ft)	833.9	821.7
Weir Submerg		Froude # Chl	0.73	0.74
Weir Max Depth (ft)		Specif Force (cu ft)	10162.7	10435.1
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	11.6	11.4
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.8	86.3
Delta EG (ft)	0.4	Conv. Total (cfs)	129288.3	131580.8
Delta WS (ft)	1.1	Top Width (ft)	72	71.86
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.25	0.05
BR Open Vel (ft/s)	14.1	C & E Loss (ft)	0.03	0.01
Coef of Q		Shear Total (lb/sq ft)	4.8	4.6
Br Sel Method	Energy only	Power Total (lb/ft s)	66.7	65.5

CULVERT

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 11700	Culvert ID: 30" CMP
Culv Q (cfs)	14.3	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.9	
Q Barrel (cfs)	14.3	Culv Vel DS (ft/s)	2.9	
E.G. US. (ft)	1758.1	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1758.1	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.7	Culv Frctn Ls (ft)	0.18	
W.S. DS (ft)	1757.7	Culv Ext Lss (ft)	0.13	
Delta EG (ft)	0.4	Culv Ent Lss (ft)	0.12	
Delta WS (ft)	0.4	Q Weir (cfs)	68.3	
E.G. IC (ft)	1757.7	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1758.1	Weir Sta Rgt (ft)	1466.4	
Culvert Control	Outlet	Weir Submerg	0.60	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	2.0	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.0	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	23.0	
Culv Crt Depth (ft)	1.3	Min El Weir Flow (ft)	1756.11	

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 13100	Opening: Bridge #1
E.G. US. (ft)	1759.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.9	E.G. Elev (ft)	1758.9	1758.5
Q Total (cfs)	12904.9	W.S. Elev (ft)	1755.3	1754.3
Q Bridge (cfs)	12904.9	Crit W.S. (ft)	1753.3	1753.0
Q Weir (cfs)		Max Chl Dpth (ft)	15.3	15.0
Weir Sta Lft (ft)		Vel Total (ft/s)	15.1	15.9
Weir Sta Rgt (ft)		Flow Area (sq ft)	856.3	814.3
Weir Submerg		Froude # Chl	0.78	0.84
Weir Max Depth (ft)		Specif Force (cu ft)	11452.1	11646.3
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	11.9	11.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	88.4	86.1
Delta EG (ft)	0.6	Conv. Total (cfs)	134732.8	129732.4
Delta WS (ft)	2.0	Top Width (ft)	72	71.85
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.3	0.06
BR Open Vel (ft/s)	15.9	C & E Loss (ft)	0.06	0.03
Coef of Q		Shear Total (lb/sq ft)	5.6	5.8
Br Sel Method	Energy only	Power Total (lb/ft s)	83.6	92.6

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 13100	Culvert ID: 30" CMP
Culv Q (cfs)	16.4	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	3.4	
Q Barrel (cfs)	16.4	Culv Vel DS (ft/s)	3.4	
E.G. US. (ft)	1759.0	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1759.0	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1758.4	Culv Frctn Ls (ft)	0.24	
W.S. DS (ft)	1758.4	Culv Ext Lss (ft)	0.17	
Delta EG (ft)	0.6	Culv Ent Lss (ft)	0.16	
Delta WS (ft)	0.6	Q Weir (cfs)	178.7	
E.G. IC (ft)	1758.7	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1759.0	Weir Sta Rgt (ft)	1600.72	
Culvert Control	Outlet	Weir Submerg	0.64	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	2.8	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.1	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	50.9	
Culv Crt Depth (ft)	1.4	Min El Weir Flow (ft)	1756.11	

Table A-6. Bucktail Bridge: No Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge

BRIDGE

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 14700	Opening: Bridge #1
E.G. US. (ft)	1760.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1756.8	E.G. Elev (ft)	1759.9	1759.5
Q Total (cfs)	14221.6	W.S. Elev (ft)	1756.1	1754.9
Q Bridge (cfs)	14221.6	Crit W.S. (ft)	1754.1	1753.7
Q Weir (cfs)		Max Chl Dpth (ft)	16.1	15.6
Weir Sta Lft (ft)		Vel Total (ft/s)	15.5	16.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	916.3	860.5
Weir Submerg		Froude # Chl	0.77	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	13018.7	13185.5
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	12.7	12.0
Min El Prs (ft)	1759.5	W.P. Total (ft)	90.1	87.4
Delta EG (ft)	0.7	Conv. Total (cfs)	149624.3	141479.7
Delta WS (ft)	3.1	Top Width (ft)	72	71.91
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.31	0.07
BR Open Vel (ft/s)	16.5	C & E Loss (ft)	0.08	0.11
Coef of Q		Shear Total (lb/sq ft)	5.7	6.2
Br Sel Method	Energy only	Power Total (lb/ft s)	89.1	102.7

CULVERT

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 14700	Culvert ID: 30" CMP
Culv Q (cfs)	19.6	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	4.0	
Q Barrel (cfs)	19.6	Culv Vel DS (ft/s)	4.0	
E.G. US. (ft)	1760.0	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.0	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1759.2	Culv Frctn Ls (ft)	0.34	
W.S. DS (ft)	1759.2	Culv Ext Lss (ft)	0.24	
Delta EG (ft)	0.8	Culv Ent Lss (ft)	0.22	
Delta WS (ft)	0.8	Q Weir (cfs)	458.8	
E.G. IC (ft)	1759.9	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1760.0	Weir Sta Rgt (ft)	1618.85	
Culvert Control	Outlet	Weir Submerg	0.61	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	3.9	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.7	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	111.7	
Culv Crt Depth (ft)	1.5	Min El Weir Flow (ft)	1756.11	

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 15000	Opening: Bridge #1
E.G. US. (ft)	1760.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1756.9	E.G. Elev (ft)	1760.1	1759.7
Q Total (cfs)	14475.8	W.S. Elev (ft)	1756.3	1755.1
Q Bridge (cfs)	14475.8	Crit W.S. (ft)	1754.2	1753.9
Q Weir (cfs)		Max Chl Dpth (ft)	16.3	15.8
Weir Sta Lft (ft)		Vel Total (ft/s)	15.6	16.6
Weir Sta Rgt (ft)		Flow Area (sq ft)	928.1	870.7
Weir Submerg		Froude # Chl	0.77	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	13329.7	13493.5
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	12.9	12.1
Min El Prs (ft)	1759.5	W.P. Total (ft)	90.4	87.7
Delta EG (ft)	0.7	Conv. Total (cfs)	152627.6	144114.9
Delta WS (ft)	3.1	Top Width (ft)	72	71.92
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.3	0.07
BR Open Vel (ft/s)	16.6	C & E Loss (ft)	0.08	0.11
Coef of Q		Shear Total (lb/sq ft)	5.8	6.3
Br Sel Method	Energy only	Power Total (lb/ft s)	89.9	104.0

CULVERT

Plan: 0902DesHyd	Trinity River	Bucktail RS: 105.035	Profile: 15000	Culvert ID: 30" CMP
Culv Q (cfs)	20.1	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	4.1	
Q Barrel (cfs)	20.1	Culv Vel DS (ft/s)	4.1	
E.G. US. (ft)	1760.2	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.2	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1759.4	Culv Frctn Ls (ft)	0.36	
W.S. DS (ft)	1759.4	Culv Ext Lss (ft)	0.25	
Delta EG (ft)	0.9	Culv Ent Lss (ft)	0.23	
Delta WS (ft)	0.9	Q Weir (cfs)	504.1	
E.G. IC (ft)	1760.1	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1760.2	Weir Sta Rgt (ft)	1622.19	
Culvert Control	Outlet	Weir Submerg	0.61	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	4.0	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.7	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	120.4	
Culv Crt Depth (ft)	1.5	Min El Weir Flow (ft)	1756.11	

Table A-7. Bucktail Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11000	1734.11	1746.9	1747.5	1.8	7.2	1.4	4.3
104.11	11000	1737.35	1748.2	1749.0	1.4	7.5	1.3	5.2
104.43	11000	1738.02	1750.3	1751.1	1.2	7.5	1.3	6.6
104.48	11000	1738.14	1750.5	1751.4	1.2	7.8	1.2	6.8
104.68	11000	1738.4	1752.2	1752.9	1.2	7.4	1.6	4.2
104.77	11000	1739.7	1753.0	1753.7	1.4	7.5	2.7	5.7
104.82	11000	1739.4	1753.6	1754.5	1.8	8.8	2.9	5.1
104.83	11000	1740.7	1754.1	1754.7	1.8	7.2	2.5	3.9
104.90	11000	1742.8	1754.7	1755.6	1.9	8.7	2.7	5.3
104.94	11000	1740.7	1755.6	1756.0	1.1	5.5	1.2	4.6
105.01	11000	1742.5	1755.7	1756.7	1.6	8.8	1.9	5.7
105.03	11000	1739.3	1755.2	1757.6	2.6	12.6	5.5	11.4
105.035	Mult Open							
105.04	11000	1740	1755.8	1757.9	0.6	11.9	4.3	10.9
105.07	11000	1745.2	1758.0	1758.4	1.2	6.1	1.7	3.6
105.08	11000	1745.2	1758.0	1758.4	0.9	5.8	1.8	4.9
105.14	11000	1745.7	1758.5	1758.8		5.7	3.1	4.2
105.17	11000	1746.5	1758.4	1759.1	1.1	7.2	1.9	4.4
103.90	11600	1734.11	1747.2	1747.9	1.9	7.4	1.5	4.4
104.11	11600	1737.35	1748.5	1749.3	1.4	7.6	1.4	5.2
104.43	11600	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11600	1738.14	1750.8	1751.8	1.3	8.0	1.2	7.0
104.68	11600	1738.4	1752.5	1753.3	1.2	7.5	1.6	4.1
104.77	11600	1739.7	1753.3	1754.1	1.5	7.6	2.7	5.7
104.82	11600	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11600	1740.7	1754.5	1755.0	1.8	7.3	2.5	3.9
104.90	11600	1742.8	1755.0	1755.9	2.0	8.7	2.8	5.3
104.94	11600	1740.7	1755.9	1756.3	1.2	5.6	1.3	4.7
105.01	11600	1742.5	1756.0	1757.0	1.6	8.9	1.9	5.7
105.03	11600	1739.3	1755.5	1758.0	2.7	13.0	5.7	11.8
105.035	Mult Open							
105.04	11600	1740	1756.1	1758.3	0.6	12.2	4.4	11.1
105.07	11600	1745.2	1758.4	1758.8	1.2	6.1	1.6	3.5
105.08	11600	1745.2	1758.4	1758.9	0.9	5.8	1.8	4.9
105.14	11600	1745.7	1758.9	1759.2		5.6	3.1	4.2
105.17	11600	1746.5	1758.8	1759.5	1.1	7.2	2.0	4.3

January 1, 1997 Flood Flow (McBain)

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Table A-7. Bucktail Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11700	1734.11	1747.3	1747.9	1.9	7.4	1.5	4.4
104.11	11700	1737.35	1748.5	1749.4	1.4	7.6	1.4	5.2
104.43	11700	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11700	1738.14	1750.9	1751.8	1.3	8.1	1.2	7.0
104.68	11700	1738.4	1752.6	1753.3	1.2	7.5	1.6	4.1
104.77	11700	1739.7	1753.4	1754.2	1.5	7.6	2.7	5.7
104.82	11700	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11700	1740.7	1754.5	1755.1	1.8	7.3	2.5	3.9
104.90	11700	1742.8	1755.1	1756.0	2.0	8.8	2.8	5.3
104.94	11700	1740.7	1755.9	1756.4	1.2	5.6	1.3	4.7
105.01	11700	1742.5	1756.0	1757.1	1.6	8.9	1.9	5.7
105.03	11700	1739.3	1755.5	1758.1	2.7	13.1	5.7	11.9
105.035	Mult Open							
105.04	11700	1740	1756.2	1758.4	0.6	12.2	4.5	11.2
105.07	11700	1745.2	1758.5	1758.9	1.2	6.1	1.6	3.5
105.08	11700	1745.2	1758.5	1759.0	0.9	5.8	1.8	4.9
105.14	11700	1745.7	1759.0	1759.3		5.6	3.1	4.2
105.17	11700	1746.5	1758.9	1759.5	1.1	7.3	2.0	4.3
103.90	13100	1734.11	1748.0	1748.7	2.0	7.7	1.6	4.5
104.11	13100	1737.35	1749.3	1750.1	1.5	7.8	1.5	5.2
104.43	13100	1738.02	1751.3	1752.3	1.4	8.1	1.4	7.1
104.48	13100	1738.14	1751.5	1752.6	1.4	8.5	1.3	7.3
104.68	13100	1738.4	1753.4	1754.1	1.4	7.7	1.7	4.1
104.77	13100	1739.7	1754.1	1754.9	1.6	7.8	2.8	5.7
104.82	13100	1739.4	1754.7	1755.7	1.9	9.2	3.1	5.0
104.83	13100	1740.7	1755.2	1755.8	1.9	7.5	2.6	3.9
104.90	13100	1742.8	1755.8	1756.7	2.2	9.1	2.7	5.3
104.94	13100	1740.7	1756.6	1757.1	1.3	6.0	1.4	4.9
105.01	13100	1742.5	1756.8	1757.8	1.7	9.1	2.1	5.5
105.03	13100	1739.3	1755.9	1758.9	3.0	14.2	6.3	12.9
105.035	Mult Open							
105.04	13100	1740	1756.8	1759.3	0.6	13.0	4.9	11.9
105.07	13100	1745.2	1759.4	1759.8	1.2	6.0	1.7	3.3
105.08	13100	1745.2	1759.4	1759.9	1.0	6.0	0.9	4.0
105.14	13100	1745.7	1759.9	1760.2		5.6	3.0	4.1
105.17	13100	1746.5	1759.8	1760.4	1.2	7.4	2.0	4.3

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-7. Bucktail Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	14700	1734.11	1748.8	1749.6	2.1	8.0	1.8	4.6
104.11	14700	1737.35	1750.1	1750.9	1.1	7.8	1.6	4.6
104.43	14700	1738.02	1752.0	1753.1	1.4	8.5	1.4	7.4
104.48	14700	1738.14	1752.2	1753.5	1.5	9.0	1.4	7.7
104.68	14700	1738.4	1754.3	1755.0	1.5	7.9	1.8	4.1
104.77	14700	1739.7	1754.9	1755.8	1.6	8.1	2.9	5.8
104.82	14700	1739.4	1755.5	1756.5	2.1	9.3	3.2	5.0
104.83	14700	1740.7	1756.1	1756.6	2.1	7.6	2.7	4.0
104.90	14700	1742.8	1756.5	1757.5	2.4	9.3	2.7	5.3
104.94	14700	1740.7	1757.3	1757.9	1.4	6.4	1.5	5.1
105.01	14700	1742.5	1757.6	1758.6	1.7	9.2	2.3	5.5
105.03	14700	1739.3	1756.3	1759.8	3.2	15.5	6.9	14.1
105.035	Mult Open							
105.04	14700	1740	1757.6	1760.4	0.7	13.8	5.3	12.6
105.07	14700	1745.2	1760.5	1760.9	1.2	5.9	1.5	2.9
105.08	14700	1745.2	1760.5	1761.0	1.1	5.7	1.1	3.5
105.14	14700	1745.7	1760.9	1761.2		5.7	2.8	3.9
105.17	14700	1746.5	1760.8	1761.5	1.3	7.5	2.1	4.3
103.90	15000	1734.11	1748.9	1749.7	2.1	8.0	1.8	4.7
104.11	15000	1737.35	1750.3	1751.1	1.2	7.8	1.6	4.5
104.43	15000	1738.02	1752.2	1753.3	1.5	8.6	1.4	7.4
104.48	15000	1738.14	1752.4	1753.6	1.5	9.1	1.4	7.7
104.68	15000	1738.4	1754.4	1755.2	1.5	7.9	1.8	4.1
104.77	15000	1739.7	1755.1	1755.9	1.6	8.1	2.9	5.8
104.82	15000	1739.4	1755.6	1756.6	2.1	9.3	3.2	5.0
104.83	15000	1740.7	1756.2	1756.8	2.1	7.6	2.7	4.0
104.90	15000	1742.8	1756.7	1757.7	2.4	9.3	2.7	5.3
104.94	15000	1740.7	1757.5	1758.1	1.4	6.4	1.6	5.2
105.01	15000	1742.5	1757.7	1758.7	1.8	9.2	2.3	5.5
105.03	15000	1739.3	1756.3	1760.0	3.3	15.8	7.0	14.3
105.035	Mult Open							
105.04	15000	1740	1757.7	1760.6	0.7	13.9	5.4	12.7
105.07	15000	1745.2	1760.8	1761.1	1.2	5.9	1.5	2.9
105.08	15000	1745.2	1760.7	1761.2	1.1	5.7	1.1	3.4
105.14	15000	1745.7	1761.1	1761.4		5.7	2.8	3.9
105.17	15000	1746.5	1761.0	1761.6	1.3	7.6	2.1	4.3

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Table A-8. Bucktail Bridge: Proposed Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

BRIDGE

January 1, 1997 Flood Flow (McBain)

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11000	Opening: Bridge #1
E.G. US. (ft)	1757.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.6	E.G. Elev (ft)	1757.8	1757.6
Q Total (cfs)	10923.2	W.S. Elev (ft)	1755.2	1754.9
Q Bridge (cfs)	10923.2	Crit W.S. (ft)	1752.3	1751.8
Q Weir (cfs)		Max Chl Dpth (ft)	15.2	15.6
Weir Sta Lft (ft)		Vel Total (ft/s)	12.8	12.8
Weir Sta Rgt (ft)		Flow Area (sq ft)	855.6	856.7
Weir Submerg		Froude # Chl	0.66	0.66
Weir Max Depth (ft)		Specif Force (cu ft)	9715.4	10046.8
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	11.9	11.9
Min El Prs (ft)	1759.5	W.P. Total (ft)	88.4	87.3
Delta EG (ft)	0.3	Conv. Total (cfs)	134563.4	140497.8
Delta WS (ft)	0.8	Top Width (ft)	72	71.9
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.2	0.04
BR Open Vel (ft/s)	12.8	C & E Loss (ft)	0.02	0
Coef of Q		Shear Total (lb/sq ft)	4.0	3.7
Br Sel Method	Energy only	Power Total (lb/ft s)	50.9	47.2

CULVERT

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11000	Culvert ID: 48" Low Arch
Culv Q (cfs)	76.8	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.8	
Q Barrel (cfs)	76.8	Culv Vel DS (ft/s)	2.8	
E.G. US. (ft)	1757.9	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1757.9	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.6	Culv Frctn Ls (ft)	0.07	
W.S. DS (ft)	1757.6	Culv Ext Lss (ft)	0.11	
Delta EG (ft)	0.3	Culv Ent Lss (ft)	0.11	
Delta WS (ft)	0.3	Q Weir (cfs)		
E.G. IC (ft)	1750.6	Weir Sta Lft (ft)		
E.G. OC (ft)	1757.9	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)		
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)	1.3	Min El Weir Flow (ft)	1760.51	

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11600	Opening: Bridge #1
E.G. US. (ft)	1758.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.9	E.G. Elev (ft)	1758.3	1758.0
Q Total (cfs)	11520.9	W.S. Elev (ft)	1755.5	1755.1
Q Bridge (cfs)	11520.9	Crit W.S. (ft)	1752.6	1752.2
Q Weir (cfs)		Max Chl Dpth (ft)	15.5	15.8
Weir Sta Lft (ft)		Vel Total (ft/s)	13.2	13.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	875.0	872.1
Weir Submerg		Froude # Chl	0.67	0.68
Weir Max Depth (ft)		Specif Force (cu ft)	10333.6	10652.5
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	12.2	12.1
Min El Prs (ft)	1759.5	W.P. Total (ft)	88.9	87.7
Delta EG (ft)	0.4	Conv. Total (cfs)	139316.4	144475.7
Delta WS (ft)	0.9	Top Width (ft)	72	71.92
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.21	0.04
BR Open Vel (ft/s)	13.2	C & E Loss (ft)	0.02	0
Coef of Q		Shear Total (lb/sq ft)	4.2	3.95
Br Sel Method	Energy only	Power Total (lb/ft s)	55.3	52.2

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11600	Culvert ID: 48" Low Arch
Culv Q (cfs)	79.1	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.9	
Q Barrel (cfs)	79.1	Culv Vel DS (ft/s)	2.9	
E.G. US. (ft)	1758.3	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1758.3	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1758.0	Culv Frctn Ls (ft)	0.07	
W.S. DS (ft)	1758.0	Culv Ext Lss (ft)	0.12	
Delta EG (ft)	0.3	Culv Ent Lss (ft)	0.12	
Delta WS (ft)	0.3	Q Weir (cfs)		
E.G. IC (ft)	1750.7	Weir Sta Lft (ft)		
E.G. OC (ft)	1758.3	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)		
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)	1.3	Min El Weir Flow (ft)	1760.51	

Table A-8. Bucktail Bridge: Proposed Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

BRIDGE

CULVERT

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11700	Opening: Bridge #1
E.G. US. (ft)	1758.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.9	E.G. Elev (ft)	1758.3	1758.1
Q Total (cfs)	11620.3	W.S. Elev (ft)	1755.5	1755.1
Q Bridge (cfs)	11620.3	Crit W.S. (ft)	1752.7	1752.2
Q Weir (cfs)		Max Chl Dpth (ft)	15.5	15.8
Weir Sta Lft (ft)		Vel Total (ft/s)	13.3	13.3
Weir Sta Rgt (ft)		Flow Area (sq ft)	877.2	873.4
Weir Submerg		Froude # Chl	0.67	0.68
Weir Max Depth (ft)		Specif Force (cu ft)	10430.9	10746.6
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	12.2	12.1
Min El Prs (ft)	1759.5	W.P. Total (ft)	89.0	87.7
Delta EG (ft)	0.4	Conv. Total (cfs)	139856.8	144820.8
Delta WS (ft)	0.9	Top Width (ft)	72	71.93
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.21	0.04
BR Open Vel (ft/s)	13.3	C & E Loss (ft)	0.02	0
Coef of Q		Shear Total (lb/sq ft)	4.3	4.0
Br Sel Method	Energy only	Power Total (lb/ft s)	56.3	53.2

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 11700	Culvert ID: 48" Low Arch
Culv Q (cfs)	79.7	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	2.9	
Q Barrel (cfs)	79.7	Culv Vel DS (ft/s)	2.9	
E.G. US. (ft)	1758.4	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1758.4	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1758.1	Culv Frctn Ls (ft)	0.07	
W.S. DS (ft)	1758.0	Culv Ext Lss (ft)	0.12	
Delta EG (ft)	0.3	Culv Ent Lss (ft)	0.12	
Delta WS (ft)	0.3	Q Weir (cfs)		
E.G. IC (ft)	1750.7	Weir Sta Lft (ft)		
E.G. OC (ft)	1758.4	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)		
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)	1.3	Min El Weir Flow (ft)	1760.51	

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 13100	Opening: Bridge #1
E.G. US. (ft)	1759.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1756.4	E.G. Elev (ft)	1759.2	1758.9
Q Total (cfs)	13012.1	W.S. Elev (ft)	1755.9	1755.3
Q Bridge (cfs)	13012.1	Crit W.S. (ft)	1753.4	1753.0
Q Weir (cfs)		Max Chl Dpth (ft)	15.9	16.0
Weir Sta Lft (ft)		Vel Total (ft/s)	14.4	14.7
Weir Sta Rgt (ft)		Flow Area (sq ft)	904.6	886.3
Weir Submerg		Froude # Chl	0.72	0.75
Weir Max Depth (ft)		Specif Force (cu ft)	11815.5	12085.2
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	12.6	12.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	89.7	88.1
Delta EG (ft)	0.4	Conv. Total (cfs)	146679.9	148197.2
Delta WS (ft)	1.3	Top Width (ft)	72	71.94
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.25	0.05
BR Open Vel (ft/s)	14.7	C & E Loss (ft)	0.04	0.01
Coef of Q		Shear Total (lb/sq ft)	5.0	4.8
Br Sel Method	Energy only	Power Total (lb/ft s)	71.3	71.1

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 13100	Culvert ID: 48" Low Arch
Culv Q (cfs)	87.9	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	3.2	
Q Barrel (cfs)	87.9	Culv Vel DS (ft/s)	3.2	
E.G. US. (ft)	1759.3	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1759.3	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1758.9	Culv Frctn Ls (ft)	0.09	
W.S. DS (ft)	1758.9	Culv Ext Lss (ft)	0.15	
Delta EG (ft)	0.4	Culv Ent Lss (ft)	0.14	
Delta WS (ft)	0.4	Q Weir (cfs)		
E.G. IC (ft)	1750.8	Weir Sta Lft (ft)		
E.G. OC (ft)	1759.3	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)		
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)	1.4	Min El Weir Flow (ft)	1760.51	

Table A-8. Bucktail Bridge: Proposed Action Alternative

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 9ft X 3.875ft Arch Culvert West of Bridge, Road El. 1760.5

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

BRIDGE

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 14700	Opening: Bridge #1
E.G. US. (ft)	1760.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1757.1	E.G. Elev (ft)	1760.3	1759.9
Q Total (cfs)	14597.1	W.S. Elev (ft)	1756.4	1755.4
Q Bridge (cfs)	14597.1	Crit W.S. (ft)	1754.3	1753.9
Q Weir (cfs)		Max Chl Dpth (ft)	16.4	16.1
Weir Sta Lft (ft)		Vel Total (ft/s)	15.5	16.3
Weir Sta Rgt (ft)		Flow Area (sq ft)	941.1	893.5
Weir Submerg		Froude # Chl	0.76	0.83
Weir Max Depth (ft)		Specif Force (cu ft)	13518.6	13710.0
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	13.1	12.4
Min El Prs (ft)	1759.5	W.P. Total (ft)	90.7	88.3
Delta EG (ft)	0.6	Conv. Total (cfs)	155924.3	150070.7
Delta WS (ft)	2.1	Top Width (ft)	72	71.95
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.29	0.06
BR Open Vel (ft/s)	16.3	C & E Loss (ft)	0.07	0.02
Coef of Q		Shear Total (lb/sq ft)	5.7	6.0
Br Sel Method	Energy only	Power Total (lb/ft s)	88.0	97.7

CULVERT

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 14700	Culvert ID: 48" Low Arch
Culv Q (cfs)	102.9	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	3.8	
Q Barrel (cfs)	102.9	Culv Vel DS (ft/s)	3.8	
E.G. US. (ft)	1760.4	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.3	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1759.8	Culv Frctn Ls (ft)	0.12	
W.S. DS (ft)	1759.8	Culv Ext Lss (ft)	0.21	
Delta EG (ft)	0.5	Culv Ent Lss (ft)	0.2	
Delta WS (ft)	0.5	Q Weir (cfs)		
E.G. IC (ft)	1751.1	Weir Sta Lft (ft)		
E.G. OC (ft)	1760.4	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)		
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)	1.6	Min El Weir Flow (ft)	1760.51	

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

BRIDGE

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 15000	Opening: Bridge #1
E.G. US. (ft)	1760.6	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1757.3	E.G. Elev (ft)	1760.5	1760.1
Q Total (cfs)	14892.7	W.S. Elev (ft)	1756.5	1755.4
Q Bridge (cfs)	14892.7	Crit W.S. (ft)	1754.4	1754.0
Q Weir (cfs)		Max Chl Dpth (ft)	16.5	16.1
Weir Sta Lft (ft)		Vel Total (ft/s)	15.7	16.7
Weir Sta Rgt (ft)		Flow Area (sq ft)	948.9	892.9
Weir Submerg		Froude # Chl	0.77	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	13851.7	14023.3
Min El Weir Flow (ft)	1762.01	Hydr Depth (ft)	13.2	12.4
Min El Prs (ft)	1759.5	W.P. Total (ft)	91.0	88.3
Delta EG (ft)	0.6	Conv. Total (cfs)	157927.5	149915.4
Delta WS (ft)	2.3	Top Width (ft)	72	71.95
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.3	0.06
BR Open Vel (ft/s)	16.7	C & E Loss (ft)	0.08	0.03
Coef of Q		Shear Total (lb/sq ft)	5.8	6.2
Br Sel Method	Energy only	Power Total (lb/ft s)	90.9	104.0

CULVERT

Plan: ExBrArCu60.5	Trinity River	Bucktail RS: 105.035	Profile: 15000	Culvert ID: 48" Low Arch
Culv Q (cfs)	106.9	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	3.9	
Q Barrel (cfs)	106.9	Culv Vel DS (ft/s)	3.9	
E.G. US. (ft)	1760.6	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.6	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1760.0	Culv Frctn Ls (ft)	0.13	
W.S. DS (ft)	1760.0	Culv Ext Lss (ft)	0.22	
Delta EG (ft)	0.6	Culv Ent Lss (ft)	0.21	
Delta WS (ft)	0.6	Q Weir (cfs)	0.4	
E.G. IC (ft)	1751.2	Weir Sta Lft (ft)	1459.9	
E.G. OC (ft)	1760.6	Weir Sta Rgt (ft)	1469.9	
Culvert Control	Outlet	Weir Submerg	0.0	
Culv WS Inlet (ft)	1752.5	Weir Max Depth (ft)	0.1	
Culv WS Outlet (ft)	1751.4	Weir Avg Depth (ft)	0.1	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	0.6	
Culv Crt Depth (ft)	1.6	Min El Weir Flow (ft)	1760.51	

Table A-9. Bucktail Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11000	1734.11	1746.9	1747.5	1.8	7.2	1.4	4.3
104.11	11000	1737.35	1748.2	1749.0	1.4	7.5	1.3	5.2
104.43	11000	1738.02	1750.3	1751.1	1.2	7.5	1.3	6.6
104.48	11000	1738.14	1750.5	1751.4	1.2	7.8	1.2	6.8
104.68	11000	1738.4	1752.2	1752.9	1.2	7.4	1.6	4.2
104.77	11000	1739.7	1753.0	1753.7	1.4	7.5	2.7	5.7
104.82	11000	1739.4	1753.6	1754.5	1.8	8.8	2.9	5.1
104.83	11000	1740.7	1754.1	1754.7	1.8	7.2	2.5	3.9
104.90	11000	1742.8	1754.7	1755.6	1.9	8.7	2.7	5.3
104.94	11000	1740.7	1755.6	1756.0	1.1	5.5	1.2	4.6
105.01	11000	1742.5	1755.7	1756.7	1.6	8.8	1.9	5.7
105.03	11000	1739.3	1756.0	1757.3	2.1	10.3	2.5	6.5
105.035	Mult Open							
105.04	11000	1740	1755.2	1757.7	0.6	12.9	4.0	12.4
105.07	11000	1745.2	1757.6	1758.4	1.5	7.6	2.9	6.4
105.08	11000	1745.2	1758.0	1758.5	0.9	5.8	2.1	5.1
105.14	11000	1745.7	1758.5	1758.9		5.6	3.1	4.2
105.17	11000	1746.5	1758.5	1759.1	1.1	7.2	1.9	4.3
103.90	11600	1734.11	1747.2	1747.9	1.9	7.4	1.5	4.4
104.11	11600	1737.35	1748.5	1749.3	1.4	7.6	1.4	5.2
104.43	11600	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11600	1738.14	1750.8	1751.8	1.3	8.0	1.2	7.0
104.68	11600	1738.4	1752.5	1753.3	1.2	7.5	1.6	4.1
104.77	11600	1739.7	1753.3	1754.1	1.5	7.6	2.7	5.7
104.82	11600	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11600	1740.7	1754.5	1755.0	1.8	7.3	2.5	3.9
104.90	11600	1742.8	1755.0	1755.9	2.0	8.7	2.8	5.3
104.94	11600	1740.7	1755.9	1756.3	1.2	5.6	1.3	4.7
105.01	11600	1742.5	1756.0	1757.0	1.6	8.9	1.9	5.7
105.03	11600	1739.3	1756.2	1757.6	2.2	10.7	2.5	6.6
105.035	Mult Open							
105.04	11600	1740	1755.3	1758.1	0.6	13.5	4.2	12.9
105.07	11600	1745.2	1757.9	1758.8	1.5	7.8	3.0	6.5
105.08	11600	1745.2	1758.4	1758.9	0.9	5.9	2.1	5.2
105.14	11600	1745.7	1758.9	1759.2		5.6	3.1	4.2
105.17	11600	1746.5	1758.8	1759.5	1.1	7.3	2.0	4.3

January 1, 1997 Flood Flow (McBain)

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Table A-9. Bucktail Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
103.90	11700	1734.11	1747.3	1747.9	1.9	7.4	1.5	4.4
104.11	11700	1737.35	1748.5	1749.4	1.4	7.6	1.4	5.2
104.43	11700	1738.02	1750.6	1751.5	1.3	7.7	1.3	6.8
104.48	11700	1738.14	1750.9	1751.8	1.3	8.1	1.2	7.0
104.68	11700	1738.4	1752.6	1753.3	1.2	7.5	1.6	4.1
104.77	11700	1739.7	1753.4	1754.2	1.5	7.6	2.7	5.7
104.82	11700	1739.4	1753.9	1754.9	1.8	8.9	3.0	5.1
104.83	11700	1740.7	1754.5	1755.1	1.8	7.3	2.5	3.9
104.90	11700	1742.8	1755.1	1756.0	2.0	8.8	2.8	5.3
104.94	11700	1740.7	1755.9	1756.4	1.2	5.6	1.3	4.7
105.01	11700	1742.5	1756.0	1757.1	1.6	8.9	1.9	5.7
105.03	11700	1739.3	1756.2	1757.7	2.2	10.7	2.5	6.6
105.035	Mult Open							
105.04	11700	1740	1755.3	1758.1	0.6	13.5	4.2	13.0
105.07	11700	1745.2	1758.0	1758.9	1.5	7.8	3.0	6.5
105.08	11700	1745.2	1758.4	1759.0	0.9	5.9	2.1	5.2
105.14	11700	1745.7	1759.0	1759.3		5.6	3.1	4.2
105.17	11700	1746.5	1758.9	1759.5	1.1	7.3	2.0	4.3
103.90	13100	1734.11	1748.0	1748.7	2.0	7.7	1.6	4.5
104.11	13100	1737.35	1749.3	1750.1	1.5	7.8	1.5	5.2
104.43	13100	1738.02	1751.3	1752.3	1.4	8.1	1.4	7.1
104.48	13100	1738.14	1751.5	1752.6	1.4	8.5	1.3	7.3
104.68	13100	1738.4	1753.4	1754.1	1.4	7.7	1.7	4.1
104.77	13100	1739.7	1754.1	1754.9	1.6	7.8	2.8	5.7
104.82	13100	1739.4	1754.7	1755.7	1.9	9.2	3.1	5.0
104.83	13100	1740.7	1755.2	1755.8	1.9	7.5	2.6	3.9
104.90	13100	1742.8	1755.8	1756.7	2.2	9.1	2.7	5.3
104.94	13100	1740.7	1756.6	1757.1	1.3	6.0	1.4	4.9
105.01	13100	1742.5	1756.8	1757.8	1.7	9.1	2.1	5.5
105.03	13100	1739.3	1756.9	1758.4	2.3	11.0	2.7	6.6
105.035	Mult Open							
105.04	13100	1740	1757.5	1759.8	0.6	12.3	2.1	9.6
105.07	13100	1745.2	1759.9	1760.2	1.1	5.7	1.6	3.0
105.08	13100	1745.2	1759.7	1760.3	1.1	6.2	0.5	4.9
105.14	13100	1745.7	1760.3	1760.6		5.4	2.8	3.9
105.17	13100	1746.5	1760.2	1760.8	1.2	7.1	2.0	4.1

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-9. Bucktail Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
103.90	14700	1734.11	1748.8	1749.6	2.1	8.0	1.8	4.6	
104.11	14700	1737.35	1750.1	1750.9	1.1	7.8	1.6	4.6	
104.43	14700	1738.02	1752.0	1753.1	1.4	8.5	1.4	7.4	
104.48	14700	1738.14	1752.2	1753.5	1.5	9.0	1.4	7.7	
104.68	14700	1738.4	1754.3	1755.0	1.5	7.9	1.8	4.1	
104.77	14700	1739.7	1754.9	1755.8	1.6	8.1	2.9	5.8	
104.82	14700	1739.4	1755.5	1756.5	2.1	9.3	3.2	5.0	
104.83	14700	1740.7	1756.1	1756.6	2.1	7.6	2.7	4.0	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
104.90	14700	1742.8	1756.5	1757.5	2.4	9.3	2.7	5.3	
104.94	14700	1740.7	1757.3	1757.9	1.4	6.4	1.5	5.1	
105.01	14700	1742.5	1757.6	1758.6	1.7	9.2	2.3	5.5	
105.03	14700	1739.3	1757.7	1759.2	2.3	11.3	2.9	6.6	
105.035	Mult Open								
105.04	14700	1740	1758.6	1760.8	0.6	12.3	2.3	8.6	
105.07	14700	1745.2	1760.9	1761.2	1.1	5.7	1.5	2.7	
105.08	14700	1745.2	1760.8	1761.3	1.2	6.1	0.9	4.2	
105.14	14700	1745.7	1761.2	1761.5		5.5	2.7	3.8	
105.17	14700	1746.5	1761.1	1761.7	1.2	7.3	2.0	4.2	
103.90	15000	1734.11	1748.9	1749.7	2.1	8.0	1.8	4.7	
104.11	15000	1737.35	1750.3	1751.1	1.2	7.8	1.6	4.5	
104.43	15000	1738.02	1752.2	1753.3	1.5	8.6	1.4	7.4	
104.48	15000	1738.14	1752.4	1753.6	1.5	9.1	1.4	7.7	
104.68	15000	1738.4	1754.4	1755.2	1.5	7.9	1.8	4.1	
104.77	15000	1739.7	1755.1	1755.9	1.6	8.1	2.9	5.8	
104.82	15000	1739.4	1755.6	1756.6	2.1	9.3	3.2	5.0	
104.83	15000	1740.7	1756.2	1756.8	2.1	7.6	2.7	4.0	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
104.90	15000	1742.8	1756.7	1757.7	2.4	9.3	2.7	5.3	
104.94	15000	1740.7	1757.5	1758.1	1.4	6.4	1.6	5.2	
105.01	15000	1742.5	1757.7	1758.7	1.8	9.2	2.3	5.5	
105.03	15000	1739.3	1757.8	1759.4	2.3	11.4	3.0	6.6	
105.035	Mult Open								
105.04	15000	1740	1758.8	1761.0	0.6	12.3	2.3	8.5	
105.07	15000	1745.2	1761.0	1761.4	1.1	5.6	1.5	2.7	
105.08	15000	1745.2	1760.9	1761.5	1.2	6.1	0.9	4.1	
105.14	15000	1745.7	1761.4	1761.7		5.5	2.7	3.8	
105.17	15000	1746.5	1761.3	1761.9	1.2	7.4	2.1	4.2	

Table A-10. Bucktail Bridge: Alternative 1

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

BRIDGE

January 1, 1997 Flood Flow (McBain)

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11000	Opening: Bridge #1
E.G. US. (ft)	1757.7	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.2	E.G. Elev (ft)	1757.6	1757.4
Q Total (cfs)	11000.0	W.S. Elev (ft)	1754.8	1754.4
Q Bridge (cfs)	11000.0	Crit W.S. (ft)	1752.3	1751.9
Q Weir (cfs)		Max Chl Dpth (ft)	14.8	15.1
Weir Sta Lft (ft)		Vel Total (ft/s)	13.3	13.4
Weir Sta Rgt (ft)		Flow Area (sq ft)	825.2	820.2
Weir Submerg		Froude # Chl	0.7	0.71
Weir Max Depth (ft)		Specif Force (cu ft)	9584.7	9878.6
Min El Weir Flow (ft)	1761.71	Hydr Depth (ft)	11.5	11.4
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.5	86.2
Delta EG (ft)	0.4	Conv. Total (cfs)	127217.4	131206.8
Delta WS (ft)	0.9	Top Width (ft)	72	71.86
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.23	0.04
BR Open Vel (ft/s)	13.4	C & E Loss (ft)	0.02	0.01
Coef of Q		Shear Total (lb/sq ft)	4.4	4.2
Br Sel Method	Energy only	Power Total (lb/ft s)	58.7	56.0

CULVERT (No Flow for this Option)

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11000	Culvert ID: 30" CMP
Culv Q (cfs)		Culv Ful Lngh (ft)		
# Barrels	1	Culv Vel US (ft/s)		
Q Barrel (cfs)		Culv Vel DS (ft/s)		
E.G. US. (ft)	1761.7	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)		Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.3	Culv Frctn Ls (ft)		
W.S. DS (ft)		Culv Ext Lss (ft)		
Delta EG (ft)		Culv Ent Lss (ft)		
Delta WS (ft)		Q Weir (cfs)		
E.G. IC (ft)		Weir Sta Lft (ft)		
E.G. OC (ft)		Weir Sta Rgt (ft)		
Culvert Control	Inlet	Weir Submerg		
Culv WS Inlet (ft)		Weir Max Depth (ft)		
Culv WS Outlet (ft)		Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)		Min El Weir Flow (ft)	1761.71	

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11600	Opening: Bridge #1
E.G. US. (ft)	1758.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.3	E.G. Elev (ft)	1758.0	1757.7
Q Total (cfs)	11600.0	W.S. Elev (ft)	1754.9	1754.3
Q Bridge (cfs)	11600.0	Crit W.S. (ft)	1752.6	1752.2
Q Weir (cfs)		Max Chl Dpth (ft)	14.9	15.0
Weir Sta Lft (ft)		Vel Total (ft/s)	14.0	14.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	828.6	815.1
Weir Submerg		Froude # Chl	0.73	0.75
Weir Max Depth (ft)		Specif Force (cu ft)	10118.5	10385.3
Min El Weir Flow (ft)	1761.71	Hydr Depth (ft)	11.5	11.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.6	86.1
Delta EG (ft)	0.4	Conv. Total (cfs)	128018.3	129940.4
Delta WS (ft)	1.2	Top Width (ft)	72	71.85
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.26	0.05
BR Open Vel (ft/s)	14.2	C & E Loss (ft)	0.03	0.01
Coef of Q		Shear Total (lb/sq ft)	4.9	4.7
Br Sel Method	Energy only	Power Total (lb/ft s)	67.9	67.0

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11600	Culvert ID: 30" CMP
Culv Q (cfs)		Culv Ful Lngh (ft)		
# Barrels	1	Culv Vel US (ft/s)		
Q Barrel (cfs)		Culv Vel DS (ft/s)		
E.G. US. (ft)	1761.7	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)		Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.6	Culv Frctn Ls (ft)		
W.S. DS (ft)		Culv Ext Lss (ft)		
Delta EG (ft)		Culv Ent Lss (ft)		
Delta WS (ft)		Q Weir (cfs)		
E.G. IC (ft)		Weir Sta Lft (ft)		
E.G. OC (ft)		Weir Sta Rgt (ft)		
Culvert Control	Inlet	Weir Submerg		
Culv WS Inlet (ft)		Weir Max Depth (ft)		
Culv WS Outlet (ft)		Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)		Min El Weir Flow (ft)	1761.71	

Table A-10. Bucktail Bridge: Alternative 1

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

BRIDGE

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11700	Opening: Bridge #1
E.G. US. (ft)	1758.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.3	E.G. Elev (ft)	1758.0	1757.7
Q Total (cfs)	11700	W.S. Elev (ft)	1754.9	1754.3
Q Bridge (cfs)	11700	Crit W.S. (ft)	1752.7	1752.3
Q Weir (cfs)		Max Chl Dpth (ft)	14.9	15.0
Weir Sta Lft (ft)		Vel Total (ft/s)	14.1	14.4
Weir Sta Rgt (ft)		Flow Area (sq ft)	829.3	813.9
Weir Submerg		Froude # Chl	0.74	0.76
Weir Max Depth (ft)		Specif Force (cu ft)	10210.8	10471.4
Min El Weir Flow (ft)	1761.71	Hydr Depth (ft)	11.5	11.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	87.6	86.1
Delta EG (ft)	0.4	Conv. Total (cfs)	128199.7	129636.1
Delta WS (ft)	1.2	Top Width (ft)	72	71.85
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.26	0.05
BR Open Vel (ft/s)	14.4	C & E Loss (ft)	0.03	0.01
Coef of Q		Shear Total (lb/sq ft)	4.9	4.8
Br Sel Method	Energy only	Power Total (lb/ft s)	69.4	69.1

CULVERT (No Flow for this Option)

Plan: ExBrCvRBQ100	Trinity River	Bucktail RS: 105.035	Profile: 11700	Culvert ID: 30" CMP
Culv Q (cfs)		Culv Ful Lngh (ft)		
# Barrels	1	Culv Vel US (ft/s)		
Q Barrel (cfs)		Culv Vel DS (ft/s)		
E.G. US. (ft)	1761.7	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)		Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1757.7	Culv Frctn Ls (ft)		
W.S. DS (ft)		Culv Ext Lss (ft)		
Delta EG (ft)		Culv Ent Lss (ft)		
Delta WS (ft)		Q Weir (cfs)		
E.G. IC (ft)		Weir Sta Lft (ft)		
E.G. OC (ft)		Weir Sta Rgt (ft)		
Culvert Control	Inlet	Weir Submerg		
Culv WS Inlet (ft)		Weir Max Depth (ft)		
Culv WS Outlet (ft)		Weir Avg Depth (ft)		
Culv Nml Depth (ft)		Wr Flw Area (sq ft)		
Culv Crt Depth (ft)		Min El Weir Flow (ft)	1761.71	

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 13100	Opening: Bridge #1
E.G. US. (ft)	1759.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1755.9	E.G. Elev (ft)	1758.9	1758.5
Q Total (cfs)	12904.9	W.S. Elev (ft)	1755.3	1754.3
Q Bridge (cfs)	12904.9	Crit W.S. (ft)	1753.3	1753.0
Q Weir (cfs)		Max Chl Dpth (ft)	15.3	15.0
Weir Sta Lft (ft)		Vel Total (ft/s)	15.1	15.9
Weir Sta Rgt (ft)		Flow Area (sq ft)	856.3	814.3
Weir Submerg		Froude # Chl	0.78	0.84
Weir Max Depth (ft)		Specif Force (cu ft)	11452.1	11646.3
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	11.9	11.3
Min El Prs (ft)	1759.5	W.P. Total (ft)	88.4	86.1
Delta EG (ft)	0.6	Conv. Total (cfs)	134732.8	129732.4
Delta WS (ft)	2.0	Top Width (ft)	72	71.85
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.3	0.06
BR Open Vel (ft/s)	15.9	C & E Loss (ft)	0.06	0.03
Coef of Q		Shear Total (lb/sq ft)	5.6	5.8
Br Sel Method	Energy only	Power Total (lb/ft s)	83.6	92.6

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 13100	Culvert ID: 30" CMP
Culv Q (cfs)	16.4	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	3.4	
Q Barrel (cfs)	16.4	Culv Vel DS (ft/s)	3.4	
E.G. US. (ft)	1759.0	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1759.0	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1758.4	Culv Frctn Ls (ft)	0.24	
W.S. DS (ft)	1758.4	Culv Ext Lss (ft)	0.17	
Delta EG (ft)	0.6	Culv Ent Lss (ft)	0.16	
Delta WS (ft)	0.6	Q Weir (cfs)	178.7	
E.G. IC (ft)	1758.7	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1759.0	Weir Sta Rgt (ft)	1600.72	
Culvert Control	Outlet	Weir Submerg	0.6	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	2.8	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.1	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	50.9	
Culv Crt Depth (ft)	1.4	Min El Weir Flow (ft)	1756.11	

Table A-10. Bucktail Bridge: Alternative 1

Bridge and Culvert Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge Abutments and Superstructure, 30in CMP West of Bridge, Right Bank Levee Contain Q100 Elevations

BRIDGE

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 14700	Opening: Bridge #1
E.G. US. (ft)	1760.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1756.8	E.G. Elev (ft)	1759.9	1759.6
Q Total (cfs)	14236.9	W.S. Elev (ft)	1756.1	1754.9
Q Bridge (cfs)	14236.9	Crit W.S. (ft)	1754.1	1753.7
Q Weir (cfs)		Max Chl Dpth (ft)	16.1	15.6
Weir Sta Lft (ft)		Vel Total (ft/s)	15.5	16.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	917.0	861.3
Weir Submerg		Froude # Chl	0.77	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	13037.6	13204.3
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	12.7	12.0
Min El Prs (ft)	1759.5	W.P. Total (ft)	90.1	87.4
Delta EG (ft)	0.7	Conv. Total (cfs)	149815.2	141663.2
Delta WS (ft)	3.1	Top Width (ft)	72	71.91
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.31	0.07
BR Open Vel (ft/s)	16.5	C & E Loss (ft)	0.08	0.11
Coef of Q		Shear Total (lb/sq ft)	5.7	6.2
Br Sel Method	Energy only	Power Total (lb/ft s)	89.1	102.7

CULVERT (No Flow for this Option)

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 14700	Culvert ID: 30" CMP
Culv Q (cfs)	19.4	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	4.0	
Q Barrel (cfs)	19.4	Culv Vel DS (ft/s)	4.0	
E.G. US. (ft)	1760.0	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.0	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1759.2	Culv Frctn Ls (ft)	0.34	
W.S. DS (ft)	1759.2	Culv Ext Lss (ft)	0.24	
Delta EG (ft)	0.8	Culv Ent Lss (ft)	0.22	
Delta WS (ft)	0.8	Q Weir (cfs)	443.7	
E.G. IC (ft)	1759.9	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1760.0	Weir Sta Rgt (ft)	1617.7	
Culvert Control	Outlet	Weir Submerg	0.6	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	3.9	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.7	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	108.8	
Culv Crt Depth (ft)	1.5	Min El Weir Flow (ft)	1756.11	

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 15000	Opening: Bridge #1
E.G. US. (ft)	1760.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1756.9	E.G. Elev (ft)	1760.1	1759.7
Q Total (cfs)	14475.8	W.S. Elev (ft)	1756.3	1755.1
Q Bridge (cfs)	14475.8	Crit W.S. (ft)	1754.2	1753.9
Q Weir (cfs)		Max Chl Dpth (ft)	16.3	15.8
Weir Sta Lft (ft)		Vel Total (ft/s)	15.6	16.6
Weir Sta Rgt (ft)		Flow Area (sq ft)	928.1	870.7
Weir Submerg		Froude # Chl	0.77	0.85
Weir Max Depth (ft)		Specif Force (cu ft)	13329.7	13493.5
Min El Weir Flow (ft)	1757.56	Hydr Depth (ft)	12.9	12.1
Min El Prs (ft)	1759.5	W.P. Total (ft)	90.4	87.7
Delta EG (ft)	0.7	Conv. Total (cfs)	152627.6	144114.9
Delta WS (ft)	3.1	Top Width (ft)	72	71.92
BR Open Area (sq ft)	1101.2	Frctn Loss (ft)	0.3	0.07
BR Open Vel (ft/s)	16.6	C & E Loss (ft)	0.08	0.11
Coef of Q		Shear Total (lb/sq ft)	5.8	6.3
Br Sel Method	Energy only	Power Total (lb/ft s)	89.9	104.0

Plan: RBQ100HiQ	Trinity River	Bucktail RS: 105.035	Profile: 15000	Culvert ID: 30" CMP
Culv Q (cfs)	20.1	Culv Ful Lngh (ft)	44	
# Barrels	1	Culv Vel US (ft/s)	4.1	
Q Barrel (cfs)	20.1	Culv Vel DS (ft/s)	4.1	
E.G. US. (ft)	1760.2	Culv Inv El Up (ft)	1748.6	
W.S. US. (ft)	1760.2	Culv Inv El Dn (ft)	1747.5	
E.G. DS (ft)	1759.4	Culv Frctn Ls (ft)	0.36	
W.S. DS (ft)	1759.4	Culv Ext Lss (ft)	0.25	
Delta EG (ft)	0.9	Culv Ent Lss (ft)	0.23	
Delta WS (ft)	0.9	Q Weir (cfs)	504.1	
E.G. IC (ft)	1760.1	Weir Sta Lft (ft)	1370.9	
E.G. OC (ft)	1760.2	Weir Sta Rgt (ft)	1622.19	
Culvert Control	Outlet	Weir Submerg	0.6	
Culv WS Inlet (ft)	1751.1	Weir Max Depth (ft)	4.0	
Culv WS Outlet (ft)	1750.0	Weir Avg Depth (ft)	1.7	
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	120.4	
Culv Crt Depth (ft)	1.5	Min El Weir Flow (ft)	1756.11	

Table A-11. Poker Bar Bridges: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

As-Built Bridges with Abutments: Original Dimensions

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
101.39	12200	1704.2	1711.5	1712.2	1.7	6.9	1.0	6.3
101.57	12200	1697.7	1712.5	1713.8	2.0	9.2	1.3	8.3
101.71	12200	1704.7	1717.1	1717.9	2.7	8.9	2.8	5.2
101.83	12200	1705.8	1719.8	1720.7	2.0	8.3	2.9	6.7
102.05	12200	1709.1	1723.2	1723.8	1.3	7.8	2.7	4.8
102.34	12200	1713.0	1725.7	1726.3	1.1	7.7	3.8	5.2
102.37	12200	1709.0	1725.1	1727.2		13.3	9.0	11.0
102.375	Mult Open							
102.38	12200	1708.8	1726.5	1728.0		11.0	7.5	9.1
102.39	12200	1711.9	1727.8	1728.1	0.8	6.4	3.0	4.0
101.39	12400	1704.2	1711.6	1712.3	1.7	7.0	1.1	6.3
101.57	12400	1697.7	1712.5	1713.8	2.1	9.3	1.4	8.4
101.71	12400	1704.7	1717.1	1718.0	2.7	8.9	2.8	5.2
101.83	12400	1705.8	1719.8	1720.8	2.0	8.3	2.9	6.8
102.05	12400	1709.1	1723.2	1723.9	1.4	7.8	2.7	4.8
102.34	12400	1713.0	1725.8	1726.4	1.1	7.7	3.9	5.2
102.37	12400	1709.0	1725.2	1727.3		13.5	9.1	11.1
102.375	Mult Open							
102.38	12400	1708.8	1726.7	1728.1		11.1	7.5	9.1
102.39	12400	1711.9	1727.9	1728.3	0.8	6.4	3.0	4.0
101.39	15000	1704.2	1712.3	1713.1	1.9	7.5	1.3	6.7
101.57	15000	1697.7	1713.2	1714.9	2.4	10.6	1.8	9.3
101.71	15000	1704.7	1718.3	1719.0	2.7	8.7	3.1	5.0
101.83	15000	1705.8	1720.5	1721.7	2.5	9.4	3.3	7.5
102.05	15000	1709.1	1724.4	1725.1	1.5	8.2	3.0	5.0
102.34	15000	1713.0	1726.8	1727.4	1.2	8.3	3.9	5.3
102.37	15000	1709.0	1725.8	1728.6		15.4	10.5	12.7
102.375	Mult Open							
102.38	15000	1708.8	1729.7	1730.5	0.1	7.2	6.8	6.9
102.39	15000	1711.9	1730.2	1730.5	0.8	6.2	2.8	3.6

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

January 1, 1997 Flood Flow (McBain)

Table A-11. Poker Bar Bridges: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
101.39	16400	1704.2	1712.7	1713.6	2.0	7.8	1.3	6.9	
101.57	16400	1697.7	1713.5	1715.4	2.6	11.2	2.0	9.7	
101.71	16400	1704.7	1718.7	1719.5	2.8	8.7	3.2	5.0	
101.83	16400	1705.8	1720.9	1722.3	2.8	9.8	3.5	7.8	
102.05	16400	1709.1	1725.0	1725.7	1.5	8.4	3.2	5.1	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
102.34	16400	1713.0	1727.3	1728.0	1.3	8.6	4.0	5.3	
102.37	16400	1709.0	1726.0	1729.2		16.4	11.3	13.6	
102.375	Mult Open								
102.38	16400	1708.8	1729.8	1730.6	0.2	7.9	7.3	7.5	
102.39	16400	1711.9	1730.3	1730.7	0.9	6.7	3.0	3.9	
101.39	17000	1704.2	1712.8	1713.7	2.0	7.9	1.4	6.9	
101.57	17000	1697.7	1713.7	1715.7	2.7	11.5	2.1	9.9	
101.71	17000	1704.7	1719.0	1719.7	2.8	8.7	3.3	5.0	
101.83	17000	1705.8	1721.1	1722.5	2.9	10.0	3.6	7.9	
102.05	17000	1709.1	1725.4	1726.0	1.5	7.9	2.5	4.0	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
102.34	17000	1713.0	1727.5	1728.2	1.3	8.7	4.0	5.3	
102.37	17000	1709.0	1726.1	1729.5		16.9	11.6	14.0	
102.375	Mult Open								
102.38	17000	1708.8	1729.9	1730.8	0.2	8.1	7.4	7.6	
102.39	17000	1711.9	1730.5	1730.9	0.9	6.9	3.1	4.0	
101.39	18500	1704.2	1713.2	1714.2	2.1	8.1	1.5	7.1	
101.57	18500	1697.7	1714.0	1716.2	2.9	12.1	2.4	10.3	
101.71	18500	1704.7	1719.5	1720.2	2.8	8.8	3.4	5.0	
101.83	18500	1705.8	1721.6	1723.0	3.1	10.4	3.8	8.2	
102.05	18500	1709.1	1725.8	1726.4	1.5	8.1	2.6	4.1	Annual: Q50 w/ ROD (11,000 cfs) Release
102.34	18500	1713.0	1727.9	1728.7	1.3	9.0	4.0	5.4	
102.37	18500	1709.0	1726.2	1730.1		18.1	12.5	15.0	
102.375	Mult Open								
102.38	18500	1708.8	1730.2	1731.2	0.4	8.5	7.4	7.8	
102.39	18500	1711.9	1730.8	1731.3	0.9	7.3	3.2	4.2	

Table A-11. Poker Bar Bridges: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
101.39	23400	1704.2	1714.3	1715.5	2.3	8.9	1.7	7.6
101.57	23400	1697.7	1715.0	1718.0	3.5	14.2	2.8	11.7
101.71	23400	1704.7	1721.0	1721.7	3.1	8.9	3.8	5.2
101.83	23400	1705.8	1722.9	1724.7	3.8	11.7	4.3	9.0
102.05	23400	1709.1	1726.9	1727.6	1.7	8.9	3.0	4.5
102.34	23400	1713.0	1729.2	1730.0	1.5	9.9	4.4	5.8
102.37	23400	1709.0	1728.9	1731.7		14.8	12.5	13.3
102.375	Mult Open							
102.38	23400	1708.8	1731.9	1732.8	0.9	9.1	6.7	7.4
102.39	23400	1711.9	1732.3	1732.9	1.1	8.1	3.6	4.6

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-12. Poker Bar Bridges: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

LEFT BRIDGE

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrLT13	Trinity	Poker Bar	RS: 102.375	Profile: 12200	Opening: Bridge #1
E.G. US. (ft)		1728.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1727.4	E.G. Elev (ft)	1728.0	1728.0
Q Total (cfs)		4151.4	W.S. Elev (ft)	1727.4	1727.4
Q Bridge (cfs)		4037.2	Crit W.S. (ft)	1717.5	1718.4
Q Weir (cfs)		114.2	Max Chl Dpth (ft)	18.6	18.4
Weir Sta Lft (ft)		1264.17	Vel Total (ft/s)	6.6	7.2
Weir Sta Rgt (ft)		1343.77	Flow Area (sq ft)	609.8	561.2
Weir Submerg		0	Froude # Chl	0.03	0.03
Weir Max Depth (ft)		0.9	Specif Force (cu ft)	6299.4	5726.1
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)		184.4
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	97.2
Delta EG (ft)		0.8	Conv. Total (cfs)	96887.0	89434.1
Delta WS (ft)		1.0	Top Width (ft)		3.04
BR Open Area (sq ft)		609.8	Frctn Loss (ft)		
BR Open Vel (ft/s)		6.6	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	0.7	0.8
Br Sel Method		Press/Weir	Power Total (lb/ft s)	4.4	5.6

RIGHT BRIDGE

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: ExBrLT13	Trinity	Poker Bar	RS: 102.375	Profile: 12200	Opening: Bridge #2
E.G. US. (ft)		1728.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1725.5	E.G. Elev (ft)	1728.0	1727.8
Q Total (cfs)		8048.6	W.S. Elev (ft)	1725.5	1724.6
Q Bridge (cfs)		8048.6	Crit W.S. (ft)	1723.7	1724.0
Q Weir (cfs)			Max Chl Dpth (ft)	12.4	11.8
Weir Sta Lft (ft)			Vel Total (ft/s)	12.6	14.3
Weir Sta Rgt (ft)			Flow Area (sq ft)	639.1	563.2
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	6452.2	6195.6
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)	8.6	7.9
Min El Prs (ft)		1728.1	W.P. Total (ft)	80.8	77.1
Delta EG (ft)		0.2	Conv. Total (cfs)	128236.5	105078.0
Delta WS (ft)		1.6	Top Width (ft)	74.71	71.72
BR Open Area (sq ft)		806.3	Frctn Loss (ft)	0.1	0.01
BR Open Vel (ft/s)		14.3	C & E Loss (ft)	0.07	0.06
Coef of Q			Shear Total (lb/sq ft)	2.0	2.7
Br Sel Method		Energy only	Power Total (lb/ft s)	24.5	38.3

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Plan: ExBrLT13	Trinity	Poker Bar	RS: 102.375	Profile: 12400	Opening: Bridge #1
E.G. US. (ft)		1728.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1727.5	E.G. Elev (ft)	1728.1	1728.1
Q Total (cfs)		4215.0	W.S. Elev (ft)	1727.5	1727.5
Q Bridge (cfs)		4066.2	Crit W.S. (ft)	1717.6	1718.5
Q Weir (cfs)		148.8	Max Chl Dpth (ft)	18.7	18.5
Weir Sta Lft (ft)		1260.59	Vel Total (ft/s)	6.7	7.2
Weir Sta Rgt (ft)		1346.32	Flow Area (sq ft)	609.8	561.5
Weir Submerg		0	Froude # Chl	0.03	0.03
Weir Max Depth (ft)		1.0	Specif Force (cu ft)	6388.3	5809.5
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)		314.5
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	98.6
Delta EG (ft)		0.8	Conv. Total (cfs)	96887.0	88671.5
Delta WS (ft)		1.1	Top Width (ft)		1.79
BR Open Area (sq ft)		609.8	Frctn Loss (ft)		
BR Open Vel (ft/s)		6.7	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	0.7	0.8
Br Sel Method		Press/Weir	Power Total (lb/ft s)	4.5	5.8

Plan: ExBrLT13	Trinity	Poker Bar	RS: 102.375	Profile: 12400	Opening: Bridge #2
E.G. US. (ft)		1728.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1725.6	E.G. Elev (ft)	1728.1	1727.9
Q Total (cfs)		8185.0	W.S. Elev (ft)	1725.6	1724.7
Q Bridge (cfs)		8185.0	Crit W.S. (ft)	1723.8	1724.0
Q Weir (cfs)			Max Chl Dpth (ft)	12.5	11.9
Weir Sta Lft (ft)			Vel Total (ft/s)	12.7	14.3
Weir Sta Rgt (ft)			Flow Area (sq ft)	646.6	571.5
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	6586.4	6329.3
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)	8.6	7.9
Min El Prs (ft)		1728.1	W.P. Total (ft)	81.3	77.6
Delta EG (ft)		0.2	Conv. Total (cfs)	130406.1	107472.2
Delta WS (ft)		1.6	Top Width (ft)	75.13	72.14
BR Open Area (sq ft)		806.3	Frctn Loss (ft)	0.09	0.01
BR Open Vel (ft/s)		14.3	C & E Loss (ft)	0.07	0.06
Coef of Q			Shear Total (lb/sq ft)	2.0	2.7
Br Sel Method		Energy only	Power Total (lb/ft s)	24.8	38.2

Table A-12. Poker Bar Bridges: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

LEFT BRIDGE

January 1, 1997 Flood Flow (McBain)

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 15000	Opening: Bridge #1	
E.G. US. (ft)		1730.3	Element	Inside BR US	Inside BR DS	
W.S. US. (ft)		1728.5	E.G. Elev (ft)	1730.25	1730.25	
Q Total (cfs)		7452.4	W.S. Elev (ft)	1728.54	1728.54	
Q Bridge (cfs)		5952.8	Crit W.S. (ft)	1721.02	1722.03	
Q Weir (cfs)		1499.6	Max Chl Dpth (ft)	19.74	19.54	
Weir Sta Lft (ft)		1172.1	Vel Total (ft/s)	9.76	10.6	
Weir Sta Rgt (ft)		1386.7	Flow Area (sq ft)	609.84	561.65	
Weir Submerg		0	Froude # Chl	0.04	0.04	
Weir Max Depth (ft)		3.2	Specif Force (cu ft)	7996.99	7449.41	
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)			
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.16	100.6	
Delta EG (ft)		1.7	Conv. Total (cfs)	96887	87549.6	
Delta WS (ft)		3.3	Top Width (ft)			
BR Open Area (sq ft)		609.8	Frctn Loss (ft)			
BR Open Vel (ft/s)		9.8	C & E Loss (ft)			
Coef of Q			Shear Total (lb/sq ft)	2.12	2.53	
Br Sel Method	Press/Weir		Power Total (lb/ft s)	20.71	26.77	

RIGHT BRIDGE

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 15000	Opening: Bridge #2	
E.G. US. (ft)		1730.3	Element	Inside BR US	Inside BR DS	
W.S. US. (ft)		1729.5	E.G. Elev (ft)	1730.3	1730.1	
Q Total (cfs)		7547.6	W.S. Elev (ft)	1729.5	1729.5	
Q Bridge (cfs)		7122.4	Crit W.S. (ft)	1723.3	1723.6	
Q Weir (cfs)		425.2	Max Chl Dpth (ft)	16.4	16.7	
Weir Sta Lft (ft)		1402.12	Vel Total (ft/s)	8.8	8.8	
Weir Sta Rgt (ft)		1601.37	Flow Area (sq ft)	813.7	806.3	
Weir Submerg		0	Froude # Chl	0.04	0.04	
Weir Max Depth (ft)		2.0	Specif Force (cu ft)	8274.8	8096.6	
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)			
Min El Prs (ft)		1728.1	W.P. Total (ft)	172.0	173.2	
Delta EG (ft)		1.8	Conv. Total (cfs)	118575.2	115967.5	
Delta WS (ft)		2.5	Top Width (ft)			
BR Open Area (sq ft)		813.7	Frctn Loss (ft)			
BR Open Vel (ft/s)		8.8	C & E Loss (ft)			
Coef of Q			Shear Total (lb/sq ft)	1.2	1.2	
Br Sel Method	Press/Weir		Power Total (lb/ft s)	10.5	10.9	

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 16400	Opening: Bridge #1	
E.G. US. (ft)		1730.6	Element	Inside BR US	Inside BR DS	
W.S. US. (ft)		1728.6	E.G. Elev (ft)	1730.6	1730.6	
Q Total (cfs)		8084.3	W.S. Elev (ft)	1728.6	1728.6	
Q Bridge (cfs)		6174.2	Crit W.S. (ft)	1721.6	1722.7	
Q Weir (cfs)		1910.1	Max Chl Dpth (ft)	19.8	19.6	
Weir Sta Lft (ft)		1172.1	Vel Total (ft/s)	10.1	11.0	
Weir Sta Rgt (ft)		1387.56	Flow Area (sq ft)	609.8	561.7	
Weir Submerg		0	Froude # Chl	0.04	0.05	
Weir Max Depth (ft)		3.5	Specif Force (cu ft)	8187.6	7647.5	
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)			
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	100.6	
Delta EG (ft)		1.4	Conv. Total (cfs)	96886.9	87549.6	
Delta WS (ft)		3.2	Top Width (ft)			
BR Open Area (sq ft)		609.8	Frctn Loss (ft)			
BR Open Vel (ft/s)		10.1	C & E Loss (ft)			
Coef of Q			Shear Total (lb/sq ft)	2.5	3.0	
Br Sel Method	Press/Weir		Power Total (lb/ft s)	25.3	32.7	

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 16400	Opening: Bridge #2	
E.G. US. (ft)		1730.6	Element	Inside BR US	Inside BR DS	
W.S. US. (ft)		1729.7	E.G. Elev (ft)	1730.6	1730.5	
Q Total (cfs)		8315.7	W.S. Elev (ft)	1729.7	1729.7	
Q Bridge (cfs)		7622.2	Crit W.S. (ft)	1723.9	1724.1	
Q Weir (cfs)		693.5	Max Chl Dpth (ft)	16.6	16.9	
Weir Sta Lft (ft)		1387.56	Vel Total (ft/s)	9.4	9.5	
Weir Sta Rgt (ft)		1604.31	Flow Area (sq ft)	813.7	806.3	
Weir Submerg		0	Froude # Chl	0.04	0.04	
Weir Max Depth (ft)		2.3	Specif Force (cu ft)	8767.1	8589.6	
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)			
Min El Prs (ft)		1728.1	W.P. Total (ft)	172.0	173.2	
Delta EG (ft)		1.5	Conv. Total (cfs)	118575.2	115967.5	
Delta WS (ft)		2.3	Top Width (ft)			
BR Open Area (sq ft)		813.7	Frctn Loss (ft)			
BR Open Vel (ft/s)		9.4	C & E Loss (ft)			
Coef of Q			Shear Total (lb/sq ft)	1.5	1.5	
Br Sel Method	Press/Weir		Power Total (lb/ft s)	13.6	14.1	

Table A-12. Poker Bar Bridges: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

LEFT BRIDGE

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 17000	Opening: Bridge #1
E.G. US. (ft)		1730.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.7	E.G. Elev (ft)	1730.8	1730.8
Q Total (cfs)		8356.0	W.S. Elev (ft)	1728.7	1728.7
Q Bridge (cfs)		6265.7	Crit W.S. (ft)	1721.9	1722.9
Q Weir (cfs)		2090.4	Max Chl Dpth (ft)	19.9	19.7
Weir Sta Lft (ft)		1172.1	Vel Total (ft/s)	10.3	11.2
Weir Sta Rgt (ft)		1387.56	Flow Area (sq ft)	609.8	561.7
Weir Submerg		0	Froude # Chl	0.04	0.05
Weir Max Depth (ft)		3.7	Specif Force (cu ft)	8267.5	7730.6
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)		
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	100.6
Delta EG (ft)		1.3	Conv. Total (cfs)	96887.0	87549.6
Delta WS (ft)		3.2	Top Width (ft)		
BR Open Area (sq ft)		609.8	Frctn Loss (ft)		
BR Open Vel (ft/s)		10.3	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	2.7	3.2
Br Sel Method	Press/Weir		Power Total (lb/ft s)	27.4	35.4

RIGHT BRIDGE

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 17000	Opening: Bridge #2
E.G. US. (ft)		1730.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1729.8	E.G. Elev (ft)	1730.8	1730.7
Q Total (cfs)		8644.0	W.S. Elev (ft)	1729.8	1729.8
Q Bridge (cfs)		7808.3	Crit W.S. (ft)	1724.1	1724.4
Q Weir (cfs)		835.7	Max Chl Dpth (ft)	16.7	17.0
Weir Sta Lft (ft)		1387.56	Vel Total (ft/s)	9.6	9.7
Weir Sta Rgt (ft)		1605.15	Flow Area (sq ft)	813.7	806.3
Weir Submerg		0	Froude # Chl	0.04	0.04
Weir Max Depth (ft)		2.5	Specif Force (cu ft)	8959.9	8782.6
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)		
Min El Prs (ft)		1728.1	W.P. Total (ft)	172.0	173.2
Delta EG (ft)		1.3	Conv. Total (cfs)	118575.2	115967.5
Delta WS (ft)		2.2	Top Width (ft)		
BR Open Area (sq ft)		813.7	Frctn Loss (ft)		
BR Open Vel (ft/s)		9.6	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	1.6	1.6
Br Sel Method	Press/Weir		Power Total (lb/ft s)	15.1	15.6

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 18500	Opening: Bridge #1
E.G. US. (ft)		1731.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.7	E.G. Elev (ft)	1731.1	1731.1
Q Total (cfs)		8985.4	W.S. Elev (ft)	1728.7	1728.7
Q Bridge (cfs)		6423.3	Crit W.S. (ft)	1722.5	1723.5
Q Weir (cfs)		2562.1	Max Chl Dpth (ft)	19.9	19.7
Weir Sta Lft (ft)		1172.1	Vel Total (ft/s)	10.5	11.4
Weir Sta Rgt (ft)		1387.56	Flow Area (sq ft)	609.8	561.7
Weir Submerg		0	Froude # Chl	0.04	0.05
Weir Max Depth (ft)		4.0	Specif Force (cu ft)	8398.8	7868.4
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)		
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	100.6
Delta EG (ft)		1.0	Conv. Total (cfs)	96887.0	87549.6
Delta WS (ft)		3.2	Top Width (ft)		
BR Open Area (sq ft)		609.8	Frctn Loss (ft)		
BR Open Vel (ft/s)		10.5	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	3.1	3.7
Br Sel Method	Press/Weir		Power Total (lb/ft s)	32.5	42.0

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 18500	Opening: Bridge #2
E.G. US. (ft)		1731.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1730.1	E.G. Elev (ft)	1731.2	1731.0
Q Total (cfs)		9514.6	W.S. Elev (ft)	1730.1	1730.1
Q Bridge (cfs)		8274.5	Crit W.S. (ft)	1724.8	1725.0
Q Weir (cfs)		1240.1	Max Chl Dpth (ft)	17.0	17.3
Weir Sta Lft (ft)		1387.56	Vel Total (ft/s)	10.2	10.3
Weir Sta Rgt (ft)		1607.51	Flow Area (sq ft)	813.7	806.3
Weir Submerg		0	Froude # Chl	0.04	0.04
Weir Max Depth (ft)		2.9	Specif Force (cu ft)	9498.7	9321.8
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)		
Min El Prs (ft)		1728.1	W.P. Total (ft)	172.0	173.2
Delta EG (ft)		1.1	Conv. Total (cfs)	118575.2	115967.5
Delta WS (ft)		2.1	Top Width (ft)		
BR Open Area (sq ft)		813.7	Frctn Loss (ft)		
BR Open Vel (ft/s)		10.2	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	1.9	2.0
Br Sel Method	Press/Weir		Power Total (lb/ft s)	19.3	20.1

Table A-12. Poker Bar Bridges: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry
As-Built Bridges with Abutments: Original Dimensions

Annual: Q100 w/ ROD (11,000 cfs) Release

LEFT BRIDGE

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 23400	Opening: Bridge #1
E.G. US. (ft)		1732.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1731.4	E.G. Elev (ft)	1732.8	1732.7
Q Total (cfs)		10038.8	W.S. Elev (ft)	1731.4	1731.1
Q Bridge (cfs)		5268.3	Crit W.S. (ft)	1723.5	1724.6
Q Weir (cfs)		4770.6	Max Chl Dpth (ft)	22.6	22.1
Weir Sta Lft (ft)		1139.2	Vel Total (ft/s)	8.6	9.4
Weir Sta Rgt (ft)		1387.56	Flow Area (sq ft)	609.8	561.7
Weir Submerg		0.86	Froude # Chl	0.04	0.04
Weir Max Depth (ft)		5.7	Specif Force (cu ft)	9365.2	8470.3
Min El Weir Flow (ft)		1727.2	Hydr Depth (ft)		
Min El Prs (ft)		1727.02	W.P. Total (ft)	106.2	100.6
Delta EG (ft)		0.1	Conv. Total (cfs)	96887.0	87549.6
Delta WS (ft)		0.8	Top Width (ft)		
BR Open Area (sq ft)		561.7	Frctn Loss (ft)		
BR Open Vel (ft/s)		9.4	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	3.9	4.6
Br Sel Method	Press/Weir		Power Total (lb/ft s)	33.3	43.0

RIGHT BRIDGE

Plan: 0502Pres	Trinity	Poker Bar	RS: 102.375	Profile: 23400	Opening: Bridge #2
E.G. US. (ft)		1732.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1731.5	E.G. Elev (ft)	1732.8	1732.5
Q Total (cfs)		13361.2	W.S. Elev (ft)	1731.5	1731.5
Q Bridge (cfs)		9774.6	Crit W.S. (ft)	1727.2	1727.3
Q Weir (cfs)		3586.5	Max Chl Dpth (ft)	18.4	18.7
Weir Sta Lft (ft)		1387.56	Vel Total (ft/s)	12.0	12.1
Weir Sta Rgt (ft)		2217.9	Flow Area (sq ft)	813.7	806.3
Weir Submerg		0	Froude # Chl	0.05	0.05
Weir Max Depth (ft)		4.5	Specif Force (cu ft)	11626.5	11449.1
Min El Weir Flow (ft)		1728.41	Hydr Depth (ft)		
Min El Prs (ft)		1728.1	W.P. Total (ft)	172.0	173.2
Delta EG (ft)		0.8	Conv. Total (cfs)	118575.2	115967.5
Delta WS (ft)		4.2	Top Width (ft)		
BR Open Area (sq ft)		813.7	Frctn Loss (ft)		
BR Open Vel (ft/s)		12.0	C & E Loss (ft)		
Coef of Q			Shear Total (lb/sq ft)	3.8	3.9
Br Sel Method	Press/Weir		Power Total (lb/ft s)	45.1	46.8

Table A-13. Poker Bar Bridges: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
101.39	12200	1704.2	1711.5	1712.2	1.7	6.9	1.0	6.3
101.57	12200	1697.7	1712.5	1713.8	2.0	9.2	1.3	8.3
101.71	12200	1704.7	1717.1	1717.9	2.7	8.9	2.8	5.2
101.83	12200	1705.8	1719.8	1720.7	2.0	8.3	2.9	6.7
102.05	12200	1709.1	1723.2	1723.8	1.3	7.8	2.7	4.8
102.34	12200	1713.0	1725.7	1726.3	1.1	7.7	3.8	5.2
102.37	12200	1709.0	1725.5	1727.1		6.7	11.6	9.0
102.38	12200	1708.8	1726.0	1727.2		6.0	10.2	7.9
102.384	Mult Open							
102.387	12200	1711.1	1726.6	1727.3	1.0	7.2	6.1	6.5
102.39	12200	1711.9	1726.7	1727.3	0.9	7.3	4.5	5.4
102.61	12200	1714.7	1727.5	1728.9	2.0	9.7	1.4	6.9
101.39	12400	1704.2	1711.6	1712.3	1.7	7.0	1.1	6.3
101.57	12400	1697.7	1712.5	1713.8	2.1	9.3	1.4	8.4
101.71	12400	1704.7	1717.1	1718.0	2.7	8.9	2.8	5.2
101.83	12400	1705.8	1719.8	1720.8	2.0	8.3	2.9	6.8
102.05	12400	1709.1	1723.2	1723.9	1.4	7.8	2.7	4.8
102.34	12400	1713.0	1725.8	1726.4	1.1	7.7	3.9	5.2
102.37	12400	1709.0	1725.6	1727.2		6.8	11.7	9.1
102.38	12400	1708.8	1726.1	1727.3		6.0	10.4	7.9
102.384	Mult Open							
102.387	12400	1711.1	1726.7	1727.4	1.0	7.3	6.1	6.6
102.39	12400	1711.9	1726.8	1727.4	0.9	7.3	4.5	5.5
102.61	12400	1714.7	1727.6	1729.0	2.0	9.8	1.4	7.0
101.39	15000	1704.2	1712.3	1713.1	1.9	7.5	1.3	6.7
101.57	15000	1697.7	1713.2	1714.9	2.4	10.6	1.8	9.3
101.71	15000	1704.7	1718.3	1719.0	2.7	8.7	3.1	5.0
101.83	15000	1705.8	1720.7	1721.9	2.5	9.2	3.3	7.3
102.05	15000	1709.1	1724.4	1725.1	1.4	8.1	2.3	4.1
102.34	15000	1713.0	1726.8	1727.4	1.2	8.3	3.9	5.3
102.37	15000	1709.0	1726.3	1728.3		7.4	13.3	10.2
102.38	15000	1708.8	1727.0	1728.5	0.1	6.5	11.7	8.8
102.384	Mult Open							
102.387	15000	1711.1	1727.8	1728.6	1.2	8.0	6.6	7.1
102.39	15000	1711.9	1728.0	1728.6	1.0	8.0	4.8	5.9
102.61	15000	1714.7	1728.7	1730.3	2.3	10.7	1.5	7.5

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

January 1, 1997 Flood Flow (McBain)

Table A-13. Poker Bar Bridges: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
101.39	16400	1704.2	1712.6	1713.6	2.0	7.8	1.3	6.9
101.57	16400	1697.7	1713.5	1715.4	2.6	11.2	2.0	9.7
101.71	16400	1704.7	1718.7	1719.5	2.8	8.7	3.2	5.0
101.83	16400	1705.8	1721.2	1722.4	2.8	9.6	3.5	7.6
102.05	16400	1709.1	1725.0	1725.6	1.5	8.0	2.4	4.1
102.34	16400	1713.0	1727.2	1727.9	1.3	8.6	4.0	5.3
102.37	16400	1709.0	1726.7	1728.9		7.7	14.1	10.7
102.38	16400	1708.8	1727.4	1729.1	0.4	6.8	12.2	9.2
102.384	Mult Open							
102.387	16400	1711.1	1728.3	1729.2	1.2	8.3	6.8	7.3
102.39	16400	1711.9	1728.5	1729.2	1.1	8.3	5.0	6.1
102.61	16400	1714.7	1729.2	1731.0	2.4	11.2	1.6	7.7
101.39	17000	1704.2	1712.8	1713.7	2.0	7.9	1.4	6.9
101.57	17000	1697.7	1713.7	1715.7	2.7	11.5	2.1	9.9
101.71	17000	1704.7	1719.0	1719.7	2.8	8.7	3.3	5.0
101.83	17000	1705.8	1721.4	1722.7	2.8	9.8	3.5	7.7
102.05	17000	1709.1	1725.1	1725.7	1.5	8.3	2.5	4.2
102.34	17000	1713.0	1727.4	1728.1	1.3	8.8	4.0	5.4
102.37	17000	1709.0	1726.8	1729.2		7.9	14.5	11.0
102.38	17000	1708.8	1727.6	1729.3	0.5	7.0	12.5	9.4
102.384	Mult Open							
102.387	17000	1711.1	1728.5	1729.4	1.3	8.5	6.9	7.5
102.39	17000	1711.9	1728.7	1729.5	1.1	8.5	5.1	6.2
102.61	17000	1714.7	1729.4	1731.3	2.4	11.4	1.6	7.9
101.39	18500	1704.2	1713.2	1714.2	2.1	8.1	1.5	7.1
101.57	18500	1697.7	1714.0	1716.2	2.9	12.1	2.4	10.3
101.71	18500	1704.7	1719.5	1720.2	2.8	8.8	3.4	5.0
101.83	18500	1705.8	1721.9	1723.2	3.1	10.1	3.7	7.9
102.05	18500	1709.1	1725.6	1726.3	1.5	8.3	2.6	4.2
102.34	18500	1713.0	1727.9	1728.6	1.3	9.0	4.1	5.5
102.37	18500	1709.0	1727.1	1729.8		8.3	15.4	11.6
102.38	18500	1708.8	1728.1	1729.9	0.7	7.2	12.8	9.7
102.384	Mult Open							
102.387	18500	1711.1	1729.1	1730.1	1.3	8.8	7.1	7.7
102.39	18500	1711.9	1729.3	1730.1	1.1	8.8	5.3	6.4
102.61	18500	1714.7	1730.0	1731.9	2.6	11.9	1.8	8.1

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Annual: Q50 w/ ROD (11,000 cfs) Release

Table A-13. Poker Bar Bridges: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
101.39	23400	1704.2	1714.3	1715.5	2.3	8.9	1.7	7.6
101.57	23400	1697.7	1715.0	1718.0	3.5	14.2	2.8	11.7
101.71	23400	1704.7	1721.0	1721.7	3.1	8.9	3.8	5.2
101.83	23400	1705.8	1722.9	1724.7	3.8	11.7	4.3	9.0
102.05	23400	1709.1	1726.6	1727.4	1.7	9.2	3.1	4.7
102.34	23400	1713.0	1729.1	1730.0	1.5	10.0	4.4	5.8
102.37	23400	1709.0	1727.6	1731.5		9.8	18.6	14.0
102.38	23400	1708.8	1729.6	1731.8	1.2	8.0	13.9	10.7
102.384	Mult Open							
102.387	23400	1711.1	1730.7	1732.0	1.5	9.8	7.9	8.5
102.39	23400	1711.9	1731.0	1732.0	1.3	9.8	5.8	7.0
102.61	23400	1714.7	1731.6	1734.0	2.9	13.3	2.1	8.7

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-14. Poker Bar Bridges: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

LEFT BRIDGE

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 12200	Opening: Bridge #1
E.G. US. (ft)		1727.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1726.3	E.G. Elev (ft)	1727.3	1727.2
Q Total (cfs)		6639.7	W.S. Elev (ft)	1726.3	1726.3
Q Bridge (cfs)		6639.7	Crit W.S. (ft)	1720.6	1719.5
Q Weir (cfs)			Max Chl Dpth (ft)	15.2	17.5
Weir Sta Lft (ft)			Vel Total (ft/s)	7.0	7.4
Weir Sta Rgt (ft)			Flow Area (sq ft)	942.7	901.8
Weir Submerg			Froude # Chl	0.4	0.38
Weir Max Depth (ft)			Specif Force (cu ft)	7128.6	7955.0
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	8.9	11.6
Min El Prs (ft)		1740.47	W.P. Total (ft)	116.9	94.2
Delta EG (ft)		0.1	Conv. Total (cfs)	186694.4	201337.3
Delta WS (ft)		0.0	Top Width (ft)	106.41	78.1
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		7.4	C & E Loss (ft)	0.04	0
Coef of Q			Shear Total (lb/sq ft)	0.6	0.7
Br Sel Method	Energy only		Power Total (lb/ft s)	4.5	4.8

RIGHT BRIDGE

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 12200	Opening: Bridge #2
E.G. US. (ft)		1727.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1726.7	E.G. Elev (ft)	1727.3	1727.2
Q Total (cfs)		5560.4	W.S. Elev (ft)	1726.5	1726.2
Q Bridge (cfs)		5560.4	Crit W.S. (ft)	1721.4	1721.8
Q Weir (cfs)			Max Chl Dpth (ft)	12.6	13.1
Weir Sta Lft (ft)			Vel Total (ft/s)	6.9	8.0
Weir Sta Rgt (ft)			Flow Area (sq ft)	811.9	693.0
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	5633.1	5160.5
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	10.2	8.9
Min El Prs (ft)		1731.5	W.P. Total (ft)	93.4	84.1
Delta EG (ft)		0.1	Conv. Total (cfs)	149440.5	143909.8
Delta WS (ft)		0.5	Top Width (ft)	80	77.7
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		8.0	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	0.8	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	5.1	6.2

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 12400	Opening: Bridge #1
E.G. US. (ft)		1727.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1726.4	E.G. Elev (ft)	1727.4	1727.3
Q Total (cfs)		6751.5	W.S. Elev (ft)	1726.4	1726.4
Q Bridge (cfs)		6751.5	Crit W.S. (ft)	1720.7	1719.6
Q Weir (cfs)			Max Chl Dpth (ft)	15.2	17.6
Weir Sta Lft (ft)			Vel Total (ft/s)	7.1	7.4
Weir Sta Rgt (ft)			Flow Area (sq ft)	951.1	908.0
Weir Submerg			Froude # Chl	0.4	0.39
Weir Max Depth (ft)			Specif Force (cu ft)	7245.8	8067.7
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	8.9	11.6
Min El Prs (ft)		1740.47	W.P. Total (ft)	117.1	94.6
Delta EG (ft)		0.1	Conv. Total (cfs)	188773.1	203077.4
Delta WS (ft)		0.0	Top Width (ft)	106.5	78.44
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		7.4	C & E Loss (ft)	0.04	0
Coef of Q			Shear Total (lb/sq ft)	0.7	0.7
Br Sel Method	Energy only		Power Total (lb/ft s)	4.6	4.9

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 12400	Opening: Bridge #2
E.G. US. (ft)		1727.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1726.8	E.G. Elev (ft)	1727.4	1727.3
Q Total (cfs)		5648.6	W.S. Elev (ft)	1726.6	1726.3
Q Bridge (cfs)		5648.6	Crit W.S. (ft)	1721.4	1721.9
Q Weir (cfs)			Max Chl Dpth (ft)	12.7	13.2
Weir Sta Lft (ft)			Vel Total (ft/s)	6.9	8.1
Weir Sta Rgt (ft)			Flow Area (sq ft)	818.9	699.5
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	5731.2	5250.0
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	10.2	9.0
Min El Prs (ft)		1731.5	W.P. Total (ft)	93.6	84.5
Delta EG (ft)		0.1	Conv. Total (cfs)	151252.4	145834.4
Delta WS (ft)		0.5	Top Width (ft)	80	78.05
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		8.1	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	0.8	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	5.3	6.3

Table A-14. Poker Bar Bridges: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

LEFT BRIDGE

January 1, 1997 Flood Flow (McBain)

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 15000	Opening: Bridge #1
E.G. US. (ft)		1728.6	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1727.4	E.G. Elev (ft)	1728.6	1728.5
Q Total (cfs)		8209.0	W.S. Elev (ft)	1727.3	1727.4
Q Bridge (cfs)		8209.0	Crit W.S. (ft)	1721.7	1720.6
Q Weir (cfs)			Max Chl Dpth (ft)	16.2	18.6
Weir Sta Lft (ft)			Vel Total (ft/s)	7.8	8.3
Weir Sta Rgt (ft)			Flow Area (sq ft)	1055.8	988.2
Weir Submerg			Froude # Chl	0.43	0.42
Weir Max Depth (ft)			Specif Force (cu ft)	8813.9	9569.6
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	9.8	11.7
Min El Prs (ft)		1740.47	W.P. Total (ft)	119.5	101.1
Delta EG (ft)		0.1	Conv. Total (cfs)	215480.2	229339.9
Delta WS (ft)		0.0	Top Width (ft)	107.52	84.26
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		8.3	C & E Loss (ft)	0.05	0
Coef of Q			Shear Total (lb/sq ft)	0.8	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	6.2	6.5

RIGHT BRIDGE

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 15000	Opening: Bridge #2
E.G. US. (ft)		1728.6	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1727.9	E.G. Elev (ft)	1728.6	1728.5
Q Total (cfs)		6791.0	W.S. Elev (ft)	1727.7	1727.3
Q Bridge (cfs)		6791.0	Crit W.S. (ft)	1722.3	1722.8
Q Weir (cfs)			Max Chl Dpth (ft)	13.8	14.2
Weir Sta Lft (ft)			Vel Total (ft/s)	7.5	8.7
Weir Sta Rgt (ft)			Flow Area (sq ft)	903.9	781.8
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	7021.5	6433.3
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	11.3	9.8
Min El Prs (ft)		1731.5	W.P. Total (ft)	95.7	87.8
Delta EG (ft)		0.1	Conv. Total (cfs)	174044.3	172041.2
Delta WS (ft)		0.6	Top Width (ft)	80	80
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		8.7	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	0.9	0.9
Br Sel Method	Energy only		Power Total (lb/ft s)	6.7	7.5

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 16400	Opening: Bridge #1
E.G. US. (ft)		1729.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1727.9	E.G. Elev (ft)	1729.2	1729.1
Q Total (cfs)		8996.7	W.S. Elev (ft)	1727.8	1727.9
Q Bridge (cfs)		8996.7	Crit W.S. (ft)	1722.2	1721.1
Q Weir (cfs)			Max Chl Dpth (ft)	16.7	19.1
Weir Sta Lft (ft)			Vel Total (ft/s)	8.1	8.7
Weir Sta Rgt (ft)			Flow Area (sq ft)	1107.6	1031.6
Weir Submerg			Froude # Chl	0.45	0.43
Weir Max Depth (ft)			Specif Force (cu ft)	9676.0	10391.0
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	10.3	10.7
Min El Prs (ft)		1740.47	W.P. Total (ft)	120.7	113.5
Delta EG (ft)		0.1	Conv. Total (cfs)	229145.9	244830.8
Delta WS (ft)		0.0	Top Width (ft)	108.02	96.25
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)		8.7	C & E Loss (ft)	0.05	0
Coef of Q			Shear Total (lb/sq ft)	0.9	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	7.2	6.7

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 16400	Opening: Bridge #2
E.G. US. (ft)		1729.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.5	E.G. Elev (ft)	1729.2	1729.1
Q Total (cfs)		7403.3	W.S. Elev (ft)	1728.2	1727.8
Q Bridge (cfs)		7403.3	Crit W.S. (ft)	1722.7	1723.2
Q Weir (cfs)			Max Chl Dpth (ft)	14.3	14.7
Weir Sta Lft (ft)			Vel Total (ft/s)	7.8	9.0
Weir Sta Rgt (ft)			Flow Area (sq ft)	946.7	823.7
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	7729.8	7087.7
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	11.8	10.3
Min El Prs (ft)		1731.5	W.P. Total (ft)	96.8	88.8
Delta EG (ft)		0.1	Conv. Total (cfs)	185886.8	185984.8
Delta WS (ft)		0.7	Top Width (ft)	80	80
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		9.0	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	1.0	0.9
Br Sel Method	Energy only		Power Total (lb/ft s)	7.6	8.2

Table A-14. Poker Bar Bridges: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

LEFT BRIDGE

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 17000	Opening: Bridge #1
E.G. US. (ft)		1729.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.0	E.G. Elev (ft)	1729.4	1729.3
Q Total (cfs)		9333.6	W.S. Elev (ft)	1728.0	1728.1
Q Bridge (cfs)		9333.6	Crit W.S. (ft)	1722.4	1721.3
Q Weir (cfs)			Max Chl Dpth (ft)	16.9	19.3
Weir Sta Lft (ft)			Vel Total (ft/s)	8.3	8.9
Weir Sta Rgt (ft)			Flow Area (sq ft)	1125.5	1048.5
Weir Submerg			Froude # Chl	0.46	0.44
Weir Max Depth (ft)			Specif Force (cu ft)	10020.3	10719.7
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	10.4	10.5
Min El Prs (ft)		1740.47	W.P. Total (ft)	121.1	117.2
Delta EG (ft)		0.1	Conv. Total (cfs)	233956.5	250352.4
Delta WS (ft)		0.0	Top Width (ft)	108.19	99.74
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		8.9	C & E Loss (ft)	0.05	0
Coef of Q			Shear Total (lb/sq ft)	0.9	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	7.7	6.9

RIGHT BRIDGE

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 17000	Opening: Bridge #2
E.G. US. (ft)		1729.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.7	E.G. Elev (ft)	1729.4	1729.3
Q Total (cfs)		7666.4	W.S. Elev (ft)	1728.4	1728.0
Q Bridge (cfs)		7666.4	Crit W.S. (ft)	1722.9	1723.4
Q Weir (cfs)			Max Chl Dpth (ft)	14.5	14.9
Weir Sta Lft (ft)			Vel Total (ft/s)	8.0	9.2
Weir Sta Rgt (ft)			Flow Area (sq ft)	962.1	838.2
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	8012.2	7350.0
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	12.0	10.5
Min El Prs (ft)		1731.5	W.P. Total (ft)	97.2	89.2
Delta EG (ft)		0.1	Conv. Total (cfs)	190192.7	190928.5
Delta WS (ft)		0.7	Top Width (ft)	80	80
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		9.2	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	1.0	1.0
Br Sel Method	Energy only		Power Total (lb/ft s)	8.0	8.7

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 18500	Opening: Bridge #1
E.G. US. (ft)		1730.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1728.6	E.G. Elev (ft)	1730.1	1730.0
Q Total (cfs)		10182.1	W.S. Elev (ft)	1728.5	1728.6
Q Bridge (cfs)		10182.1	Crit W.S. (ft)	1722.9	1721.9
Q Weir (cfs)			Max Chl Dpth (ft)	17.4	19.8
Weir Sta Lft (ft)			Vel Total (ft/s)	8.6	9.3
Weir Sta Rgt (ft)			Flow Area (sq ft)	1179.6	1099.6
Weir Submerg			Froude # Chl	0.47	0.45
Weir Max Depth (ft)			Specif Force (cu ft)	10986.9	11639.5
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	10.9	10.9
Min El Prs (ft)		1740.47	W.P. Total (ft)	122.3	118.9
Delta EG (ft)		0.1	Conv. Total (cfs)	248670.6	267256.2
Delta WS (ft)		0.0	Top Width (ft)	108.8	100.8
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.0	0.0
BR Open Vel (ft/s)		9.3	C & E Loss (ft)	0.1	0.0
Coef of Q			Shear Total (lb/sq ft)	1.0	0.8
Br Sel Method	Energy only		Power Total (lb/ft s)	8.7	7.8

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 18500	Opening: Bridge #2
E.G. US. (ft)		1730.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1729.3	E.G. Elev (ft)	1730.0	1730.0
Q Total (cfs)		8317.9	W.S. Elev (ft)	1729.0	1728.6
Q Bridge (cfs)		8317.9	Crit W.S. (ft)	1723.3	1723.9
Q Weir (cfs)			Max Chl Dpth (ft)	15.1	15.5
Weir Sta Lft (ft)			Vel Total (ft/s)	8.3	9.4
Weir Sta Rgt (ft)			Flow Area (sq ft)	1007.1	882.6
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	8802.8	8084.1
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	12.6	11.0
Min El Prs (ft)		1731.5	W.P. Total (ft)	98.3	90.3
Delta EG (ft)		0.1	Conv. Total (cfs)	203008.6	206244.4
Delta WS (ft)		0.7	Top Width (ft)	80	80
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		9.4	C & E Loss (ft)	0.03	0
Coef of Q			Shear Total (lb/sq ft)	1.1	1.0
Br Sel Method	Energy only		Power Total (lb/ft s)	8.9	9.4

Table A-14. Poker Bar Bridges: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Proposed Bridges: Steel Trusses w/ 110 ft and 80 ft Openings, Deck El. Set, 30 ft US

Annual: Q100 w/ ROD (11,000 cfs) Release

LEFT BRIDGE

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 23400	Opening: Bridge #1
E.G. US. (ft)		1732.0	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1730.0	E.G. Elev (ft)	1731.9	1731.8
Q Total (cfs)		12960.8	W.S. Elev (ft)	1729.9	1730.0
Q Bridge (cfs)		12960.8	Crit W.S. (ft)	1724.4	1723.5
Q Weir (cfs)			Max Chl Dpth (ft)	18.8	21.2
Weir Sta Lft (ft)			Vel Total (ft/s)	9.7	10.4
Weir Sta Rgt (ft)			Flow Area (sq ft)	1331.1	1245.4
Weir Submerg			Froude # Chl	0.52	0.49
Weir Max Depth (ft)			Specif Force (cu ft)	14157.3	14665.2
Min El Weir Flow (ft)		1737.64	Hydr Depth (ft)	12.1	12.0
Min El Prs (ft)		1740.47	W.P. Total (ft)	125.7	123.5
Delta EG (ft)		0.2	Conv. Total (cfs)	291439.7	317284.6
Delta WS (ft)		0.0	Top Width (ft)	110.0	103.6
BR Open Area (sq ft)		2092.3	Frctn Loss (ft)	0.0	0.0
BR Open Vel (ft/s)		10.4	C & E Loss (ft)	0.1	0.0
Coef of Q			Shear Total (lb/sq ft)	1.3	1.1
Br Sel Method	Energy only		Power Total (lb/ft s)	12.7	10.9

RIGHT BRIDGE

Plan: USBrScour	Trinity	Poker Bar	RS: 102.384	Profile: 23400	Opening: Bridge #2
E.G. US. (ft)		1731.9	Element	Inside BR US	Inside BR DS
W.S. US. (ft)		1731.0	E.G. Elev (ft)	1731.9	1731.8
Q Total (cfs)		10439.2	W.S. Elev (ft)	1730.6	1730.1
Q Bridge (cfs)		10439.2	Crit W.S. (ft)	1724.4	1725.4
Q Weir (cfs)			Max Chl Dpth (ft)	16.7	17.0
Weir Sta Lft (ft)			Vel Total (ft/s)	9.2	10.4
Weir Sta Rgt (ft)			Flow Area (sq ft)	1134.9	1006.9
Weir Submerg			Froude # Chl	0	0
Weir Max Depth (ft)			Specif Force (cu ft)	11362.3	10479.2
Min El Weir Flow (ft)		1734.01	Hydr Depth (ft)	14.2	12.6
Min El Prs (ft)		1731.5	W.P. Total (ft)	101.5	93.4
Delta EG (ft)		0.2	Conv. Total (cfs)	240726.1	251212.4
Delta WS (ft)		0.9	Top Width (ft)	80	80
BR Open Area (sq ft)		1116.6	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)		10.4	C & E Loss (ft)	0.04	0.01
Coef of Q			Shear Total (lb/sq ft)	1.3	1.2
Br Sel Method	Energy only		Power Total (lb/ft s)	12.1	12.1

Table A-15. Treadwell Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
96.3	12300	1638.02	1653.9	1654.8	2.1	8.4	1.6	5.1
96.44	12300	1640.39	1655.3	1655.9	1.7	6.6	1.6	4.4
96.7	12300	1640.95	1657.2	1657.8	2.1	6.4	1.4	4.6
96.91	12300	1644.47	1658.6	1659.2	1.9	6.5	1.4	5.4
97.03	12300	1646.68	1659.8	1660.4	2.0	6.7	1.9	5.1
97.25	12300	1648.59	1662.0	1662.7	2.0	7.5	1.9	5.2
97.34	12300	1648.15	1662.9	1663.8	2.2	7.6	2.8	6.3
97.345	Bridge							
97.35	12300	1648.21	1663.8	1664.5	1.7	7.0	2.6	5.8
97.37	12300	1649.62	1664.0	1664.7	1.8	6.8	2.3	5.6
96.3	12500	1638.02	1654.0	1654.9	2.1	8.5	1.6	5.1
96.44	12500	1640.39	1655.4	1656.0	1.7	6.7	1.6	4.4
96.7	12500	1640.95	1657.3	1657.9	2.1	6.4	1.4	4.6
96.91	12500	1644.47	1658.7	1659.3	1.9	6.6	1.4	5.4
97.03	12500	1646.68	1659.9	1660.5	2.1	6.8	1.9	5.1
97.25	12500	1648.59	1662.1	1662.8	2.1	7.6	1.9	5.2
97.34	12500	1648.15	1663.1	1663.9	2.2	7.7	2.8	6.3
97.345	Bridge							
97.35	12500	1648.21	1664.0	1664.6	1.7	7.0	2.6	5.8
97.37	12500	1649.62	1664.2	1664.8	1.8	6.9	2.4	5.6
96.3	15000	1638.02	1655.2	1656.2	2.3	9.0	1.9	5.1
96.44	15000	1640.39	1656.6	1657.3	1.9	7.3	1.7	4.7
96.7	15000	1640.95	1658.7	1659.3	2.3	6.9	1.5	4.9
96.91	15000	1644.47	1660.1	1660.7	2.1	6.9	1.5	5.5
97.03	15000	1646.68	1661.2	1661.9	2.3	7.2	2.0	5.3
97.25	15000	1648.59	1663.3	1664.2	2.3	8.0	2.1	5.4
97.34	15000	1648.15	1664.3	1665.2	2.4	8.3	3.2	6.7
97.345	Bridge							
97.35	15000	1648.21	1665.4	1666.2	1.8	7.5	2.8	6.1
97.37	15000	1649.62	1665.6	1666.4	1.4	7.3	2.6	5.9

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

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Table A-15. Treadwell Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge: As-Built Piers, Abutments, and Superstructure

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
96.3	16600	1638.02	1655.9	1657.0	2.4	9.2	2.0	5.2
96.44	16600	1640.39	1657.3	1658.1	2.0	7.7	1.8	4.9
96.7	16600	1640.95	1659.5	1660.2	2.4	7.2	1.6	5.0
96.91	16600	1644.47	1660.9	1661.6	2.2	7.1	1.6	5.6
97.03	16600	1646.68	1662.0	1662.7	2.4	7.4	1.9	5.4
97.25	16600	1648.59	1664.1	1665.0	2.4	8.2	2.2	5.5
97.34	16600	1648.15	1665.0	1666.1	2.5	8.6	3.3	7.0
97.345	Bridge							
97.35	16600	1648.21	1666.2	1667.1	1.3	7.9	2.8	6.3
97.37	16600	1649.62	1666.4	1667.3	1.6	7.7	2.5	6.0
96.3	17200	1638.02	1656.2	1657.2	2.4	9.3	2.1	5.2
96.44	17200	1640.39	1657.6	1658.4	2.0	7.8	1.8	5.0
96.7	17200	1640.95	1659.8	1660.5	2.5	7.3	1.6	5.1
96.91	17200	1644.47	1661.2	1661.9	2.2	7.2	1.6	5.6
97.03	17200	1646.68	1662.3	1663.0	2.4	7.5	1.9	5.4
97.25	17200	1648.59	1664.4	1665.3	2.5	8.3	2.2	5.5
97.34	17200	1648.15	1665.3	1666.4	2.3	8.8	3.4	7.0
97.345	Bridge							
97.35	17200	1648.21	1666.4	1667.4	1.4	8.1	2.6	6.4
97.37	17200	1649.62	1666.7	1667.6	1.6	7.8	2.5	6.1
96.3	19100	1638.02	1657.0	1658.1	2.5	9.6	2.2	5.3
96.44	19100	1640.39	1658.3	1659.2	2.1	8.2	1.9	5.2
96.7	19100	1640.95	1660.7	1661.4	2.6	7.6	1.7	5.2
96.91	19100	1644.47	1662.1	1662.8	2.4	7.4	1.7	5.7
97.03	19100	1646.68	1663.1	1663.9	2.6	7.8	2.0	5.5
97.25	19100	1648.59	1665.2	1666.2	2.6	8.6	2.3	5.6
97.34	19100	1648.15	1666.1	1667.4	1.8	9.4	2.8	7.2
97.345	Bridge							
97.35	19100	1648.21	1667.2	1668.2	1.6	8.6	2.4	6.5
97.37	19100	1649.62	1667.5	1668.4	1.8	8.2	2.4	6.3

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Annual: Q50 w/ ROD (11,000 cfs) Release

Table A-15. Treadwell Bridge: No Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)
96.3	24700	1638.02	1659.1	1660.3	2.8	10.4	2.6	5.5
96.44	24700	1640.39	1660.4	1661.5	2.4	9.3	2.1	5.7
96.7	24700	1640.95	1663.0	1663.9	2.9	8.4	1.9	5.6
96.91	24700	1644.47	1664.4	1665.3	2.6	8.0	1.9	6.0
97.03	24700	1646.68	1665.4	1666.3	2.9	8.4	2.3	5.8
97.25	24700	1648.59	1667.4	1668.6	3.1	9.7	1.8	5.8
97.34	24700	1648.15	1668.4	1669.8	2.4	10.4	2.7	7.4
97.345	Bridge							
97.35	24700	1648.21	1669.0	1670.4	2.1	9.8	2.2	6.9
97.37	24700	1649.62	1669.4	1670.6	2.2	9.3	2.5	6.8

Annual: Q100 w/ ROD (11,000 cfs) Release

Table A-16. Treadwell Bridge: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge: As-Built Piers, Abutments, and Superstructure

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 12300 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.5	Element		
W.S. US. (ft)	1663.8	E.G. Elev (ft)	1664.5	1664.5
Q Total (cfs)	12300.0	W.S. Elev (ft)	1663.8	1663.8
Q Bridge (cfs)	12216.4	Crit W.S. (ft)	1658.0	1657.9
Q Weir (cfs)	83.6	Max Chl Dpth (ft)	15.6	15.7
Weir Sta Lft (ft)	980.75	Vel Total (ft/s)	8.1	8.0
Weir Sta Rgt (ft)	1179.87	Flow Area (sq ft)	1525.6	1544.1
Weir Submerg	0	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	0.6	Specif Force (cu ft)	14737.6	14858.0
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)		
Min El Prs (ft)	1661.77	W.P. Total (ft)	427.5	428.8
Delta EG (ft)	0.7	Conv. Total (cfs)		
Delta WS (ft)	0.9	Top Width (ft)		
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	8.0	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 12500 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.6	Element		
W.S. US. (ft)	1664.0	E.G. Elev (ft)	1664.6	1664.6
Q Total (cfs)	12500.0	W.S. Elev (ft)	1664.0	1664.0
Q Bridge (cfs)	12366.0	Crit W.S. (ft)	1658.1	1658.0
Q Weir (cfs)	134.0	Max Chl Dpth (ft)	15.7	15.8
Weir Sta Lft (ft)	980.68	Vel Total (ft/s)	8.2	8.1
Weir Sta Rgt (ft)	1201.44	Flow Area (sq ft)	1526.1	1544.4
Weir Submerg	0	Froude # Chl	0.04	0.03
Weir Max Depth (ft)	0.7	Specif Force (cu ft)	15039.8	15174.3
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	81.6	83.6
Min El Prs (ft)	1661.77	W.P. Total (ft)	446.1	444.3
Delta EG (ft)	0.8	Conv. Total (cfs)		
Delta WS (ft)	0.9	Top Width (ft)	18.7	18.49
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	8.1	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

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Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 15000 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1666.2	Element		
W.S. US. (ft)	1665.4	E.G. Elev (ft)	1666.2	1666.2
Q Total (cfs)	15000.0	W.S. Elev (ft)	1665.4	1665.4
Q Bridge (cfs)	13538.6	Crit W.S. (ft)	1659.0	1658.9
Q Weir (cfs)	1461.4	Max Chl Dpth (ft)	17.2	17.3
Weir Sta Lft (ft)	980.04	Vel Total (ft/s)	8.5	8.4
Weir Sta Rgt (ft)	1238.96	Flow Area (sq ft)	1764.0	1777.8
Weir Submerg	0.05	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	2.3	Specif Force (cu ft)	18337.2	18498.2
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	7.9	7.5
Min El Prs (ft)	1661.77	W.P. Total (ft)	650.8	661.2
Delta EG (ft)	1.0	Conv. Total (cfs)		
Delta WS (ft)	1.1	Top Width (ft)	223.61	236.76
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	8.9	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-16. Treadwell Bridge: No Action Alternative
Bridge Hydraulic Properties for 2001 Surveyed Geometry
Existing Bridge: As-Built Piers, Abutments, and Superstructure

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 16600 Opening: Single BR

E.G. US. (ft)	1667.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1666.2	E.G. Elev (ft)	1667.1	1667.1
Q Total (cfs)	16600.0	W.S. Elev (ft)	1666.2	1666.2
Q Bridge (cfs)	13919.0	Crit W.S. (ft)	1659.5	1659.4
Q Weir (cfs)	2681.0	Max Chl Dpth (ft)	18.0	18.0
Weir Sta Lft (ft)	979.98	Vel Total (ft/s)	8.5	8.4
Weir Sta Rgt (ft)	1276.54	Flow Area (sq ft)	1949.8	1979.7
Weir Submerg	0.25	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	3.2	Specif Force (cu ft)	20275.7	20445.4
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	7.6	6.9
Min El Prs (ft)	1661.77	W.P. Total (ft)	685.7	713.2
Delta EG (ft)	1.0	Conv. Total (cfs)		
Delta WS (ft)	1.1	Top Width (ft)	257.89	288.3
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.1	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 17200 Opening: Single BR

E.G. US. (ft)	1667.4	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1666.4	E.G. Elev (ft)	1667.4	1667.3
Q Total (cfs)	17200.0	W.S. Elev (ft)	1666.4	1666.4
Q Bridge (cfs)	14013.8	Crit W.S. (ft)	1659.7	1659.6
Q Weir (cfs)	3186.2	Max Chl Dpth (ft)	18.2	18.3
Weir Sta Lft (ft)	979.86	Vel Total (ft/s)	8.5	8.4
Weir Sta Rgt (ft)	1286.95	Flow Area (sq ft)	2016.5	2052.0
Weir Submerg	0.3	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	3.5	Specif Force (cu ft)	20987.0	21156.5
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	7.5	7.1
Min El Prs (ft)	1661.77	W.P. Total (ft)	697.3	716.2
Delta EG (ft)	1.0	Conv. Total (cfs)		
Delta WS (ft)	1.1	Top Width (ft)	269.23	291.15
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.2	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 19100 Opening: Single BR

E.G. US. (ft)	1668.2	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1667.2	E.G. Elev (ft)	1668.2	1668.2
Q Total (cfs)	19100.0	W.S. Elev (ft)	1667.2	1667.0
Q Bridge (cfs)	14220.8	Crit W.S. (ft)	1660.2	1660.2
Q Weir (cfs)	4879.2	Max Chl Dpth (ft)	19.0	18.9
Weir Sta Lft (ft)	979.5	Vel Total (ft/s)	8.6	8.6
Weir Sta Rgt (ft)	1345.76	Flow Area (sq ft)	2230.5	2222.0
Weir Submerg	0.41	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	4.3	Specif Force (cu ft)	23233.4	23164.1
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	7.4	7.5
Min El Prs (ft)	1661.77	W.P. Total (ft)	729.8	723.3
Delta EG (ft)	0.9	Conv. Total (cfs)		
Delta WS (ft)	1.1	Top Width (ft)	301.08	297.94
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.3	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-16. Treadwell Bridge: No Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

Existing Bridge: As-Built Piers, Abutments, and Superstructure

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: 092402Exist Reach #2 2001 XS points a RS: 97.345 Profile: 24700 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1670.4	Element		
W.S. US. (ft)	1669.0	E.G. Elev (ft)	1670.4	1670.4
Q Total (cfs)	24700.0	W.S. Elev (ft)	1669.0	1668.7
Q Bridge (cfs)	13915.7	Crit W.S. (ft)	1661.1	1661.1
Q Weir (cfs)	10784.3	Max Chl Dpth (ft)	20.8	20.6
Weir Sta Lft (ft)	978.33	Vel Total (ft/s)	8.6	8.9
Weir Sta Rgt (ft)	1382.44	Flow Area (sq ft)	2879.6	2770.4
Weir Submerg	0.6	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	6.5	Specif Force (cu ft)	29827.8	29569.4
Min El Weir Flow (ft)	1663.91	Hydr Depth (ft)	7.2	7.2
Min El Prs (ft)	1661.77	W.P. Total (ft)	830.5	809.4
Delta EG (ft)	0.6	Conv. Total (cfs)		
Delta WS (ft)	0.7	Top Width (ft)	400.46	383.09
BR Open Area (sq ft)	1525.6	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.1	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-17. Treadwell Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 4ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	12300	1638.02	1653.9	1654.8	2.1	8.4	1.6	5.1	
96.44	12300	1640.39	1655.3	1655.9	1.7	6.6	1.6	4.4	
96.7	12300	1640.95	1657.0	1657.6	2.1	6.5	1.4	4.7	
96.91	12300	1644.47	1658.4	1659.0	1.9	6.7	1.4	5.5	
97.03	12300	1646.68	1659.6	1660.3	2.1	6.8	1.9	5.2	
97.25	12300	1648.59	1661.9	1662.7	2.0	7.6	1.9	5.3	Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release
97.34	12300	1648.15	1663.0	1663.7	2.2	7.4	2.7	6.0	
97.35	12300	1648.21	1663.0	1663.8	1.8	7.3	2.6	6.0	
97.37	12300	1649.62	1663.2	1664.0	1.9	7.3	2.4	6.1	
97.375	Bridge								
97.38	12300	1649.62	1663.3	1664.1	1.9	7.3	2.4	6.0	
97.56	12300	1652.08	1665.1	1665.7	1.8	6.6	2.2	5.3	
96.3	12500	1638.02	1654.0	1654.9	2.1	8.5	1.6	5.1	
96.44	12500	1640.39	1655.4	1656.0	1.7	6.7	1.6	4.4	
96.7	12500	1640.95	1657.1	1657.7	2.1	6.6	1.4	4.8	
96.91	12500	1644.47	1658.5	1659.2	1.9	6.7	1.4	5.5	
97.03	12500	1646.68	1659.7	1660.4	2.1	6.8	1.9	5.2	
97.25	12500	1648.59	1662.0	1662.8	2.1	7.6	1.9	5.3	Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release
97.34	12500	1648.15	1663.1	1663.8	2.2	7.5	2.7	6.0	
97.35	12500	1648.21	1663.1	1663.9	1.8	7.4	2.6	6.0	
97.37	12500	1649.62	1663.4	1664.1	1.9	7.4	2.5	6.1	
97.375	Bridge								
97.38	12500	1649.62	1663.4	1664.2	1.9	7.3	2.4	6.1	
97.56	12500	1652.08	1665.2	1665.8	1.8	6.6	2.2	5.4	
96.3	15000	1638.02	1655.2	1656.2	2.3	9.0	1.9	5.1	
96.44	15000	1640.39	1656.6	1657.3	1.9	7.3	1.7	4.7	
96.7	15000	1640.95	1658.4	1659.1	2.3	7.0	1.6	5.0	
96.91	15000	1644.47	1659.9	1660.6	2.1	7.0	1.5	5.7	
97.03	15000	1646.68	1661.0	1661.7	2.3	7.3	2.0	5.4	
97.25	15000	1648.59	1663.2	1664.1	2.3	8.1	2.1	5.4	January 1, 1997 Flood Flow (McBain)
97.34	15000	1648.15	1664.3	1665.2	2.4	8.1	3.0	6.4	
97.35	15000	1648.21	1664.4	1665.2	1.9	7.9	2.9	6.4	
97.37	15000	1649.62	1664.6	1665.5	2.1	7.9	2.8	6.5	
97.375	Bridge								
97.38	15000	1649.62	1664.7	1665.5	2.1	7.9	2.8	6.4	
97.56	15000	1652.08	1666.5	1667.2	2.0	7.0	2.4	5.6	

Table A-17. Treadwell Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 4ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	16600	1638.02	1655.9	1657.0	2.4	9.2	2.0	5.2	
96.44	16600	1640.39	1657.3	1658.1	2.0	7.7	1.8	4.9	
96.7	16600	1640.95	1659.2	1659.9	2.5	7.3	1.6	5.1	
96.91	16600	1644.47	1660.6	1661.4	2.2	7.2	1.6	5.8	
97.03	16600	1646.68	1661.8	1662.5	2.4	7.6	2.0	5.5	
97.25	16600	1648.59	1664.0	1664.9	2.5	8.3	2.2	5.5	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
97.34	16600	1648.15	1665.0	1666.0	2.4	8.4	3.1	6.6	
97.35	16600	1648.21	1665.1	1666.0	2.0	8.3	3.0	6.6	
97.37	16600	1649.62	1665.3	1666.3	2.2	8.3	2.9	6.7	
97.375	Bridge								
97.38	16600	1649.62	1665.4	1666.3	1.6	8.3	3.0	6.6	
97.56	16600	1652.08	1667.3	1668.0	2.1	7.3	2.5	5.8	
96.3	17200	1638.02	1656.2	1657.2	2.4	9.3	2.1	5.2	
96.44	17200	1640.39	1657.6	1658.4	2.0	7.8	1.8	5.0	
96.7	17200	1640.95	1659.5	1660.2	2.5	7.4	1.6	5.2	
96.91	17200	1644.47	1660.9	1661.7	2.2	7.3	1.6	5.8	
97.03	17200	1646.68	1662.1	1662.8	2.5	7.7	1.9	5.6	
97.25	17200	1648.59	1664.3	1665.2	2.5	8.4	2.2	5.6	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
97.34	17200	1648.15	1665.3	1666.2	2.3	8.6	3.1	6.6	
97.35	17200	1648.21	1665.3	1666.3	2.0	8.4	3.0	6.7	
97.37	17200	1649.62	1665.6	1666.6	1.6	8.4	3.0	6.8	
97.375	Bridge								
97.38	17200	1649.62	1665.7	1666.6	1.6	8.4	3.0	6.7	
97.56	17200	1652.08	1667.6	1668.3	2.2	7.4	2.5	5.8	
96.3	19100	1638.02	1657.0	1658.1	2.5	9.6	2.2	5.3	
96.44	19100	1640.39	1658.3	1659.2	2.1	8.3	1.9	5.2	
96.7	19100	1640.95	1660.4	1661.1	2.6	7.8	1.7	5.4	
96.91	19100	1644.47	1661.8	1662.6	2.3	7.6	1.7	5.9	
97.03	19100	1646.68	1662.9	1663.7	2.6	7.9	2.0	5.7	
97.25	19100	1648.59	1665.1	1666.0	2.6	8.7	2.3	5.7	Annual: Q50 w/ ROD (11,000 cfs) Release
97.34	19100	1648.15	1666.0	1667.1	1.7	9.0	3.3	6.8	
97.35	19100	1648.21	1666.1	1667.2	1.4	8.9	3.1	6.9	
97.37	19100	1649.62	1666.4	1667.4	1.8	8.9	3.0	7.0	
97.375	Bridge								
97.38	19100	1649.62	1668.3	1669.1	1.8	7.8	2.2	5.8	
97.56	19100	1652.08	1669.7	1670.4	1.7	7.1	2.0	5.3	

Table A-17. Treadwell Bridge: Proposed Action Alternative

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 4ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	24700	1638.02	1659.1	1660.3	2.8	10.4	2.6	5.5	
96.44	24700	1640.39	1660.4	1661.5	2.4	9.3	2.1	5.7	
96.7	24700	1640.95	1662.7	1663.6	3.0	8.6	1.9	5.7	
96.91	24700	1644.47	1664.2	1665.1	2.6	8.2	1.8	6.1	
97.03	24700	1646.68	1665.2	1666.1	2.9	8.6	2.3	5.9	
97.25	24700	1648.59	1667.3	1668.5	3.1	9.8	1.8	5.9	Annual: Q100 w/ ROD (11,000 cfs) Release
97.34	24700	1648.15	1668.3	1669.6	2.3	10.1	3.0	7.1	
97.35	24700	1648.21	1668.3	1669.7	2.0	10.0	2.6	7.1	
97.37	24700	1649.62	1668.7	1670.0	2.3	9.8	2.7	7.3	
97.375	Bridge								
97.38	24700	1649.62	1669.2	1670.5	2.2	9.4	2.6	6.9	
97.56	24700	1652.08	1671.1	1672.0	2.2	8.3	2.2	6.0	

Table A-18. Treadwell Bridge: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry
New Steel Truss Bridge 137ft US of Existing:
Single 3.5ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 12300 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.1	Element		
W.S. US. (ft)	1663.3	E.G. Elev (ft)	1664.1	1664.0
Q Total (cfs)	12300.0	W.S. Elev (ft)	1663.2	1663.2
Q Bridge (cfs)	12300.0	Crit W.S. (ft)	1658.0	1658.0
Q Weir (cfs)		Max Chl Dpth (ft)	13.6	13.6
Weir Sta Lft (ft)		Vel Total (ft/s)	6.4	6.4
Weir Sta Rgt (ft)		Flow Area (sq ft)	1921.5	1916.3
Weir Submerg		Froude # Chl	0.38	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	13169.0	13125.4
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	9.8	9.7
Min El Prs (ft)	1667.46	W.P. Total (ft)	220.2	220.1
Delta EG (ft)	0.1	Conv. Total (cfs)	280393.5	279305.4
Delta WS (ft)	0.1	Top Width (ft)	196.74	196.7
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	6.4	C & E Loss (ft)	0	0.02
Coef of Q		Shear Total (lb/sq ft)	1.1	1.1
Br Sel Method	Energy only	Power Total (lb/ft s)	6.7	6.8

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 12500 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.2	Element		
W.S. US. (ft)	1663.4	E.G. Elev (ft)	1664.2	1664.2
Q Total (cfs)	12500.0	W.S. Elev (ft)	1663.3	1663.3
Q Bridge (cfs)	12500.0	Crit W.S. (ft)	1658.1	1658.1
Q Weir (cfs)		Max Chl Dpth (ft)	13.7	13.7
Weir Sta Lft (ft)		Vel Total (ft/s)	6.4	6.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	1941.6	1936.4
Weir Submerg		Froude # Chl	0.38	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	13428.7	13384.3
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	9.9	9.8
Min El Prs (ft)	1667.46	W.P. Total (ft)	220.7	220.6
Delta EG (ft)	0.1	Conv. Total (cfs)	284641.3	283536.4
Delta WS (ft)	0.1	Top Width (ft)	196.9	196.86
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	6.5	C & E Loss (ft)	0	0.02
Coef of Q		Shear Total (lb/sq ft)	1.1	1.1
Br Sel Method	Energy only	Power Total (lb/ft s)	6.8	6.9

January 1, 1997 Flood Flow (McBain)

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 15000 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1665.5	Element		
W.S. US. (ft)	1664.7	E.G. Elev (ft)	1665.5	1665.5
Q Total (cfs)	15000.0	W.S. Elev (ft)	1664.6	1664.5
Q Bridge (cfs)	14994.0	Crit W.S. (ft)	1659.0	1659.0
Q Weir (cfs)	6.1	Max Chl Dpth (ft)	14.9	14.9
Weir Sta Lft (ft)	979.73	Vel Total (ft/s)	6.9	6.9
Weir Sta Rgt (ft)	997.75	Flow Area (sq ft)	2182.1	2176.4
Weir Submerg	0	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	0.5	Specif Force (cu ft)	16746.1	16693.5
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	11.7	11.6
Min El Prs (ft)	1667.46	W.P. Total (ft)	239.2	236.8
Delta EG (ft)	0.1	Conv. Total (cfs)	326763.5	328928.3
Delta WS (ft)	0.1	Top Width (ft)	186.2	188.43
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)	6.9	C & E Loss (ft)	0	0.03
Coef of Q		Shear Total (lb/sq ft)	1.2	1.2
Br Sel Method	Energy/Weir	Power Total (lb/ft s)	8.3	8.2

Table A-18. Treadwell Bridge: Proposed Action Alternative
Bridge Hydraulic Properties for 2001 Surveyed Geometry
New Steel Truss Bridge 137ft US of Existing:
Single 3.5ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 16800 Opening: Single BR

E.G. US. (ft)	1666.3	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1665.4	E.G. Elev (ft)	1666.3	1666.3
Q Total (cfs)	16600.0	W.S. Elev (ft)	1665.3	1665.3
Q Bridge (cfs)	16538.3	Crit W.S. (ft)	1659.5	1659.5
Q Weir (cfs)	61.7	Max Chl Dpth (ft)	15.7	15.7
Weir Sta Lft (ft)	979.25	Vel Total (ft/s)	7.2	7.2
Weir Sta Rgt (ft)	1019.33	Flow Area (sq ft)	2304.0	2297.3
Weir Submerg	0.04	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	1.3	Specif Force (cu ft)	18929.0	18834.5
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	16.2	16.7
Min El Prs (ft)	1667.46	W.P. Total (ft)	311.7	299.3
Delta EG (ft)	0.1	Conv. Total (cfs)	284541.1	286761.4
Delta WS (ft)	0.1	Top Width (ft)	142.2	137.27
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)	0.04	0.01
BR Open Vel (ft/s)	7.2	C & E Loss (ft)	0	0.02
Coef of Q		Shear Total (lb/sq ft)	1.6	1.6
Br Sel Method	Energy/Weir	Power Total (lb/ft s)	11.3	11.6

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 17200 Opening: Single BR

E.G. US. (ft)	1666.6	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1665.7	E.G. Elev (ft)	1666.6	1666.6
Q Total (cfs)	17200.0	W.S. Elev (ft)	1665.6	1665.6
Q Bridge (cfs)	17092.3	Crit W.S. (ft)	1659.7	1659.7
Q Weir (cfs)	107.7	Max Chl Dpth (ft)	16.0	15.9
Weir Sta Lft (ft)	979.02	Vel Total (ft/s)	7.3	7.4
Weir Sta Rgt (ft)	1039.73	Flow Area (sq ft)	2342.5	2335.1
Weir Submerg	0.11	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	1.6	Specif Force (cu ft)	19785.2	19671.0
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	18.1	17.7
Min El Prs (ft)	1667.46	W.P. Total (ft)	342.3	336.1
Delta EG (ft)	0.1	Conv. Total (cfs)	272401.0	274768.0
Delta WS (ft)	0.1	Top Width (ft)	129.44	131.88
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)	0.05	0.01
BR Open Vel (ft/s)	7.3	C & E Loss (ft)	0	0.01
Coef of Q		Shear Total (lb/sq ft)	1.7	1.7
Br Sel Method	Energy/Weir	Power Total (lb/ft s)	12.5	12.5

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 19100 Opening: Single BR

E.G. US. (ft)	1669.1	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1668.3	E.G. Elev (ft)	1669.1	1668.9
Q Total (cfs)	19100.0	W.S. Elev (ft)	1668.3	1668.2
Q Bridge (cfs)	17547.8	Crit W.S. (ft)	1660.2	1660.2
Q Weir (cfs)	1552.2	Max Chl Dpth (ft)	18.7	18.6
Weir Sta Lft (ft)	976.92	Vel Total (ft/s)	7.1	7.1
Weir Sta Rgt (ft)	1226.23	Flow Area (sq ft)	2692.0	2677.2
Weir Submerg	0.09	Froude # Chl	0.03	0.03
Weir Max Depth (ft)	4.1	Specif Force (cu ft)	27030.2	26830.9
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	14.4	14.8
Min El Prs (ft)	1667.46	W.P. Total (ft)	669.9	667.2
Delta EG (ft)	1.7	Conv. Total (cfs)		
Delta WS (ft)	2.0	Top Width (ft)	186.61	180.42
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	7.2	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-18. Treadwell Bridge: Proposed Action Alternative

Bridge Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing:

Single 3.5ft dia. Pier, 230ft Bridge Openning, Existing Bridge and Right Abutment Removed

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: US137stl1Pr Reach #2 2001 XS points a RS: 97.375 Profile: 24700 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1670.5	Element		
W.S. US. (ft)	1669.2	E.G. Elev (ft)	1670.5	1670.5
Q Total (cfs)	24700.0	W.S. Elev (ft)	1669.2	1669.2
Q Bridge (cfs)	21093.5	Crit W.S. (ft)	1661.7	1661.7
Q Weir (cfs)	3606.6	Max Chl Dpth (ft)	19.6	19.6
Weir Sta Lft (ft)	976.06	Vel Total (ft/s)	8.5	8.5
Weir Sta Rgt (ft)	1309.65	Flow Area (sq ft)	2897.0	2897.0
Weir Submerg	0.39	Froude # Chl	0.04	0.04
Weir Max Depth (ft)	5.5	Specif Force (cu ft)	32458.6	32458.6
Min El Weir Flow (ft)	1665.01	Hydr Depth (ft)	11.2	11.2
Min El Prs (ft)	1667.46	W.P. Total (ft)	741.4	741.4
Delta EG (ft)	0.5	Conv. Total (cfs)		
Delta WS (ft)	0.6	Top Width (ft)	257.63	257.63
BR Open Area (sq ft)	2444.3	Frctn Loss (ft)		
BR Open Vel (ft/s)	8.6	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Table A-19. Treadwell Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	12300	1638.02	1653.9	1654.8	2.1	8.4	1.6	5.1	
96.44	12300	1640.39	1655.3	1655.9	1.7	6.6	1.6	4.4	
96.7	12300	1640.95	1657.0	1657.6	2.1	6.5	1.4	4.7	
96.91	12300	1644.47	1658.4	1659.0	1.9	6.7	1.4	5.5	
97.03	12300	1646.68	1659.6	1660.3	2.1	6.8	1.9	5.2	
97.25	12300	1648.59	1661.9	1662.7	2.0	7.6	1.9	5.3	Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release
97.34	12300	1648.15	1663.0	1663.7	2.2	7.4	2.7	6.0	
97.35	12300	1648.21	1663.0	1663.8	1.8	7.3	2.6	6.0	
97.37	12300	1649.62	1663.2	1664.0	1.9	7.3	2.4	6.1	
97.375	Bridge								
97.38	12300	1649.62	1663.3	1664.1	1.9	7.3	2.4	6.0	
97.56	12300	1652.08	1665.1	1665.7	1.8	6.6	2.2	5.3	
96.3	12500	1638.02	1654.0	1654.9	2.1	8.5	1.6	5.1	
96.44	12500	1640.39	1655.4	1656.0	1.7	6.7	1.6	4.4	
96.7	12500	1640.95	1657.1	1657.7	2.1	6.6	1.4	4.8	
96.91	12500	1644.47	1658.5	1659.2	1.9	6.7	1.4	5.5	
97.03	12500	1646.68	1659.7	1660.4	2.1	6.8	1.9	5.2	
97.25	12500	1648.59	1662.0	1662.8	2.1	7.6	1.9	5.3	Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release
97.34	12500	1648.15	1663.1	1663.8	2.2	7.5	2.7	6.0	
97.35	12500	1648.21	1663.1	1663.9	1.8	7.4	2.6	6.0	
97.37	12500	1649.62	1663.4	1664.1	1.9	7.4	2.5	6.1	
97.375	Bridge								
97.38	12500	1649.62	1663.4	1664.2	1.9	7.3	2.4	6.1	
97.56	12500	1652.08	1665.2	1665.8	1.8	6.6	2.2	5.4	
96.3	15000	1638.02	1655.2	1656.2	2.3	9.0	1.9	5.1	
96.44	15000	1640.39	1656.6	1657.3	1.9	7.3	1.7	4.7	
96.7	15000	1640.95	1658.4	1659.1	2.3	7.0	1.6	5.0	
96.91	15000	1644.47	1659.9	1660.6	2.1	7.0	1.5	5.7	
97.03	15000	1646.68	1661.0	1661.7	2.3	7.3	2.0	5.4	
97.25	15000	1648.59	1663.2	1664.1	2.3	8.1	2.1	5.4	January 1, 1997 Flood Flow (McBain)
97.34	15000	1648.15	1664.3	1665.2	2.4	8.1	3.0	6.4	
97.35	15000	1648.21	1664.4	1665.2	1.9	7.9	2.9	6.4	
97.37	15000	1649.62	1664.6	1665.5	2.1	7.9	2.8	6.5	
97.375	Bridge								
97.38	15000	1649.62	1664.7	1665.5	2.1	7.9	2.8	6.4	
97.56	15000	1652.08	1666.5	1667.2	2.0	7.0	2.4	5.6	

Table A-19. Treadwell Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	16600	1638.02	1655.9	1657.0	2.4	9.2	2.0	5.2	
96.44	16600	1640.39	1657.3	1658.1	2.0	7.7	1.8	4.9	
96.7	16600	1640.95	1659.2	1659.9	2.5	7.3	1.6	5.1	
96.91	16600	1644.47	1660.6	1661.4	2.2	7.2	1.6	5.8	
97.03	16600	1646.68	1661.8	1662.5	2.4	7.6	2.0	5.5	
97.25	16600	1648.59	1664.0	1664.9	2.5	8.3	2.2	5.5	Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)
97.34	16600	1648.15	1665.0	1666.0	2.4	8.4	3.1	6.6	
97.35	16600	1648.21	1665.1	1666.0	2.0	8.3	3.0	6.6	
97.37	16600	1649.62	1665.3	1666.3	2.2	8.3	2.9	6.7	
97.375	Bridge								
97.38	16600	1649.62	1665.4	1666.3	1.6	8.3	3.0	6.6	
97.56	16600	1652.08	1667.3	1668.0	2.1	7.3	2.5	5.8	
96.3	17200	1638.02	1656.2	1657.2	2.4	9.3	2.1	5.2	
96.44	17200	1640.39	1657.6	1658.4	2.0	7.8	1.8	5.0	
96.7	17200	1640.95	1659.5	1660.2	2.5	7.4	1.6	5.2	
96.91	17200	1644.47	1660.9	1661.7	2.2	7.3	1.6	5.8	
97.03	17200	1646.68	1662.1	1662.8	2.5	7.7	1.9	5.6	
97.25	17200	1648.59	1664.3	1665.2	2.5	8.4	2.2	5.6	Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)
97.34	17200	1648.15	1665.3	1666.2	2.3	8.6	3.1	6.6	
97.35	17200	1648.21	1665.3	1666.3	2.0	8.4	3.0	6.7	
97.37	17200	1649.62	1665.6	1666.6	1.6	8.4	3.0	6.8	
97.375	Bridge								
97.38	17200	1649.62	1665.7	1666.6	1.6	8.4	3.0	6.7	
97.56	17200	1652.08	1667.6	1668.3	2.2	7.4	2.5	5.8	
96.3	19100	1638.02	1657.0	1658.1	2.5	9.6	2.2	5.3	
96.44	19100	1640.39	1658.3	1659.2	2.1	8.3	1.9	5.2	
96.7	19100	1640.95	1660.4	1661.1	2.6	7.8	1.7	5.4	
96.91	19100	1644.47	1661.8	1662.6	2.3	7.6	1.7	5.9	
97.03	19100	1646.68	1662.9	1663.7	2.6	7.9	2.0	5.7	
97.25	19100	1648.59	1665.1	1666.0	2.6	8.7	2.3	5.7	Annual: Q50 w/ ROD (11,000 cfs) Release
97.34	19100	1648.15	1666.0	1667.1	1.7	9.0	3.3	6.8	
97.35	19100	1648.21	1666.1	1667.2	1.4	8.9	3.1	6.9	
97.37	19100	1649.62	1666.4	1667.4	1.8	8.9	3.0	7.0	
97.375	Bridge								
97.38	19100	1649.62	1666.5	1667.5	1.8	8.8	2.9	6.9	
97.56	19100	1652.08	1668.4	1669.2	2.3	7.7	2.5	6.0	

Table A-19. Treadwell Bridge: Alternative 1

Reach Hydraulic Properties for 2001 Surveyed Geometry

New Steel Truss Bridge 137ft US of Existing: Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

X-Sec ID (river mile)	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	Vel Left (ft/s)	Vel Chnl (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	
96.3	24700	1638.02	1659.1	1660.3	2.8	10.4	2.6	5.5	
96.44	24700	1640.39	1660.4	1661.5	2.4	9.3	2.1	5.7	
96.7	24700	1640.95	1662.7	1663.6	3.0	8.6	1.9	5.7	
96.91	24700	1644.47	1664.2	1665.1	2.6	8.2	1.8	6.1	
97.03	24700	1646.68	1665.2	1666.1	2.9	8.6	2.3	5.9	
97.25	24700	1648.59	1667.3	1668.5	3.1	9.8	1.8	5.9	Annual: Q100 w/ ROD (11,000 cfs) Release
97.34	24700	1648.15	1668.3	1669.6	2.3	10.1	3.0	7.1	
97.35	24700	1648.21	1668.3	1669.7	2.0	10.0	2.6	7.1	
97.37	24700	1649.62	1668.7	1670.0	2.3	9.8	2.7	7.3	
97.375	Bridge								
97.38	24700	1649.62	1668.8	1670.1	2.3	9.7	2.7	7.2	
97.56	24700	1652.08	1670.8	1671.8	2.2	8.5	2.2	6.1	

Table A-20. Treadwell Bridge: Alternative 1

Bridge Hydraulic Properties for 2001 Surveyed Geometry
New Steel Truss Bridge 137ft US of Existing Bridge:
Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

Spring - Combined All Scenarios: Q50 w/ ROD (11,000 cfs) Release
Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 12300 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.1	Element		
W.S. US. (ft)	1663.3	E.G. Elev (ft)	1664.1	1664.0
Q Total (cfs)	12300.0	W.S. Elev (ft)	1663.2	1663.2
Q Bridge (cfs)	12300.0	Crit W.S. (ft)	1658.0	1658.0
Q Weir (cfs)		Max Chl Dpth (ft)	13.6	13.6
Weir Sta Lft (ft)		Vel Total (ft/s)	6.4	6.4
Weir Sta Rgt (ft)		Flow Area (sq ft)	1921.5	1916.3
Weir Submerg		Froude # Chl	0.38	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	13169.0	13125.4
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	9.8	9.7
Min El Prs (ft)	1669	W.P. Total (ft)	220.2	220.1
Delta EG (ft)	0.1	Conv. Total (cfs)	280393.5	279305.4
Delta WS (ft)	0.1	Top Width (ft)	196.74	196.7
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	6.4	C & E Loss (ft)	0	0.02
Coef of Q		Shear Total (lb/sq ft)	1.1	1.1
Br Sel Method	Energy only	Power Total (lb/ft s)	6.7	6.8

Spring - Combined All Scenarios: Q100 w/ ROD (11,000 cfs) Release
Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 12500 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1664.2	Element		
W.S. US. (ft)	1663.4	E.G. Elev (ft)	1664.2	1664.2
Q Total (cfs)	12500.0	W.S. Elev (ft)	1663.3	1663.3
Q Bridge (cfs)	12500.0	Crit W.S. (ft)	1658.1	1658.1
Q Weir (cfs)		Max Chl Dpth (ft)	13.7	13.7
Weir Sta Lft (ft)		Vel Total (ft/s)	6.4	6.5
Weir Sta Rgt (ft)		Flow Area (sq ft)	1941.6	1936.4
Weir Submerg		Froude # Chl	0.38	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	13428.7	13384.3
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	9.9	9.8
Min El Prs (ft)	1669	W.P. Total (ft)	220.7	220.6
Delta EG (ft)	0.1	Conv. Total (cfs)	284641.3	283536.4
Delta WS (ft)	0.1	Top Width (ft)	196.9	196.86
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	6.5	C & E Loss (ft)	0	0.02
Coef of Q		Shear Total (lb/sq ft)	1.1	1.1
Br Sel Method	Energy only	Power Total (lb/ft s)	6.8	6.9

January 1, 1997 Flood Flow (McBain)
Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 15000 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1665.5	Element		
W.S. US. (ft)	1664.7	E.G. Elev (ft)	1665.5	1665.5
Q Total (cfs)	15000.0	W.S. Elev (ft)	1664.6	1664.5
Q Bridge (cfs)	15000.0	Crit W.S. (ft)	1659.0	1659.0
Q Weir (cfs)		Max Chl Dpth (ft)	14.9	14.9
Weir Sta Lft (ft)		Vel Total (ft/s)	6.9	6.9
Weir Sta Rgt (ft)		Flow Area (sq ft)	2182.2	2176.9
Weir Submerg		Froude # Chl	0.39	0.4
Weir Max Depth (ft)		Specif Force (cu ft)	16741.0	16690.9
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	11.0	11.0
Min El Prs (ft)	1669	W.P. Total (ft)	226.7	226.6
Delta EG (ft)	0.1	Conv. Total (cfs)	337005.2	335809.2
Delta WS (ft)	0.1	Top Width (ft)	198.87	198.83
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	6.9	C & E Loss (ft)	0	0.03
Coef of Q		Shear Total (lb/sq ft)	1.2	1.2
Br Sel Method	Energy only	Power Total (lb/ft s)	8.2	8.3

Table A-20. Treadwell Bridge: Alternative 1

Bridge Hydraulic Properties for 2001 Surveyed Geometry
New Steel Truss Bridge 137ft US of Existing Bridge:
Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

Spring: Tributary Q50 w/ Maximum Controlled Release (13,750 cfs)

Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 16600 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1666.3	Element		
W.S. US. (ft)	1665.4	E.G. Elev (ft)	1666.3	1666.3
Q Total (cfs)	16600.0	W.S. Elev (ft)	1665.3	1665.2
Q Bridge (cfs)	16600.0	Crit W.S. (ft)	1659.5	1659.5
Q Weir (cfs)		Max Chl Dpth (ft)	15.6	15.6
Weir Sta Lft (ft)		Vel Total (ft/s)	7.1	7.2
Weir Sta Rgt (ft)		Flow Area (sq ft)	2323.7	2318.2
Weir Submerg		Froude # Chl	0.4	0.4
Weir Max Depth (ft)		Specif Force (cu ft)	18891.7	18837.1
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	11.6	11.6
Min El Prs (ft)	1669	W.P. Total (ft)	230.2	230.0
Delta EG (ft)	0.1	Conv. Total (cfs)	369223.1	367947.5
Delta WS (ft)	0.1	Top Width (ft)	200.02	199.97
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	7.2	C & E Loss (ft)	0	0.03
Coef of Q		Shear Total (lb/sq ft)	1.3	1.3
Br Sel Method	Energy only	Power Total (lb/ft s)	9.1	9.2

Spring: Tributary Q100 w/ Maximum Controlled Release (13,750 cfs)

Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 17200 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1666.6	Element		
W.S. US. (ft)	1665.7	E.G. Elev (ft)	1666.6	1666.6
Q Total (cfs)	17200.0	W.S. Elev (ft)	1665.5	1665.5
Q Bridge (cfs)	17200.0	Crit W.S. (ft)	1659.7	1659.7
Q Weir (cfs)		Max Chl Dpth (ft)	15.9	15.9
Weir Sta Lft (ft)		Vel Total (ft/s)	7.2	7.3
Weir Sta Rgt (ft)		Flow Area (sq ft)	2377.2	2371.7
Weir Submerg		Froude # Chl	0.4	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	19729.8	19673.5
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	11.9	11.8
Min El Prs (ft)	1669	W.P. Total (ft)	231.5	231.3
Delta EG (ft)	0.1	Conv. Total (cfs)	381677.4	380372.9
Delta WS (ft)	0.1	Top Width (ft)	200.45	200.41
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	7.3	C & E Loss (ft)	0	0.03
Coef of Q		Shear Total (lb/sq ft)	1.3	1.3
Br Sel Method	Energy only	Power Total (lb/ft s)	9.4	9.5

Annual: Q50 w/ ROD (11,000 cfs) Release

Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 19100 Opening: Single BR

			Inside BR US	Inside BR DS
E.G. US. (ft)	1667.5	Element		
W.S. US. (ft)	1666.5	E.G. Elev (ft)	1667.5	1667.5
Q Total (cfs)	19100.0	W.S. Elev (ft)	1666.3	1666.3
Q Bridge (cfs)	19100.0	Crit W.S. (ft)	1660.2	1660.2
Q Weir (cfs)		Max Chl Dpth (ft)	16.7	16.7
Weir Sta Lft (ft)		Vel Total (ft/s)	7.5	7.6
Weir Sta Rgt (ft)		Flow Area (sq ft)	2535.2	2529.2
Weir Submerg		Froude # Chl	0.42	0.42
Weir Max Depth (ft)		Specif Force (cu ft)	22369.4	22307.1
Min El Weir Flow (ft)	1671.01	Hydr Depth (ft)	12.0	12.0
Min El Prs (ft)	1669	W.P. Total (ft)	245.4	244.6
Delta EG (ft)	0.1	Conv. Total (cfs)	416198.7	414991.9
Delta WS (ft)	0.1	Top Width (ft)	212.04	211.27
BR Open Area (sq ft)	3141.9	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)	7.6	C & E Loss (ft)	0	0.03
Coef of Q		Shear Total (lb/sq ft)	1.4	1.4
Br Sel Method	Energy only	Power Total (lb/ft s)	10.2	10.3

Table A-20. Treadwell Bridge: Alternative 1

Bridge Hydraulic Properties for 2001 Surveyed Geometry
New Steel Truss Bridge 137ft US of Existing Bridge:
Single 3.5ft dia. Pier, 230ft Bridge Openning, Not Overtopped, Existing Bridge and Right Abutment Removed

Annual: Q100 w/ ROD (11,000 cfs) Release

Plan: 137StlQ100 Reach #2 2001 XS points a RS: 97.375 Profile: 24700 Opening: Single BR

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	1670.1	E.G. Elev (ft)	1670.1	1670.0
W.S. US. (ft)	1668.8	W.S. Elev (ft)	1668.6	1668.6
Q Total (cfs)	24700.0	Crit W.S. (ft)	1661.7	1661.7
Q Bridge (cfs)	24700.0	Max Chl Dpth (ft)	19.0	19.0
Q Weir (cfs)		Vel Total (ft/s)	8.1	8.1
Weir Sta Lft (ft)		Flow Area (sq ft)	3051.0	3044.2
Weir Sta Rgt (ft)		Froude # Chl	0.43	0.43
Weir Submerg		Specif Force (cu ft)	30891.3	30815.0
Weir Max Depth (ft)		Hydr Depth (ft)	13.5	13.4
Min El Weir Flow (ft)	1671.01	W.P. Total (ft)	268.6	268.4
Min El Prs (ft)	1669	Conv. Total (cfs)	534850.3	533164.3
Delta EG (ft)	0.1	Top Width (ft)	226.5	226.5
Delta WS (ft)	0.1	Frctn Loss (ft)	0.03	0.01
BR Open Area (sq ft)	3141.9	C & E Loss (ft)	0	0.04
BR Open Vel (ft/s)	8.1	Shear Total (lb/sq ft)	1.5	1.5
Coef of Q		Power Total (lb/ft s)	12.3	12.3
Br Sel Method	Energy only			

APPENDIX K

Memorandum
Alternative Access to Salt Flat Review

MEMORANDUM

DATE: **April 24, 2003**

TO: **Project File**

FROM: **Noelyn C. Habana, Trinity River Restoration Program**
Rehabilitation Implementation Group, Trinity River Restoration Program

SUBJECT: **Supplement to NSR 10006 Report**
Salt Flat Access Road Alternatives

Introduction:

Alternatives to replacing the Salt Flat Bridge are currently being analyzed. Part of the process of looking at alternatives involves the possibility of locating an overland access for the residents during construction of a new bridge or even having the overland access become permanent in lieu of a new bridge.

Background:

Four alternative access were identified and evaluated in the North State Resources (NSR) Report (NSR 10006) dated July 12, 2002. The Salt Flat road alternatives include:

Route 1. Bucktail to Salt Flat subdivision,
Route 2. Salt Flat subdivision to Wright Ranch,
Route 3. Rush Creek Road to landing above BLM Salt Flat parcel, and
Route 4. Rush Creek Road to Salt Flat Green Gate.

Route 1 begins at the southwest corner of the Bucktail subdivision in the vicinity of the transmission access road. It connects to a gated road which prohibits trespass. The route is not maintained and is impassable for vehicles because of significant landslides and fill failures.

Route 2 begins approximately 1000 feet up the Salt Flat road, and travels north along a roadbed connected to the Wright Ranch property. A large landslide associated with a stream crossing prevents vehicular access.

Route 3 and Route 4 both begin at a gate adjacent to Rush Creek Road, where Rush Creek Road crosses Rush Creek. Route 4 splits into a northern segment and curves back to meet Route 3 at Salt Flat, at a Sierra Pacific Industries (SPI) gated access (green gate). Route 3 has about 3.6 miles of road accessible by high clearance vehicles under dry weather conditions. The road ends at a landing, approximately 300 vertical feet above the Salt Flat residential area. Various skid roads stem from the end of Route 3, but their grades are in excess of 15% with 10 feet width. An additional 0.5 miles of major construction would be needed to connect Route 3 to Salt Flat (to the SPI gate). Route 4 has two unique North and South segments, each with locked gate on either side. The entire 4.4 miles road of Route 4 would require a high clearance vehicle under

dry conditions. About 2 miles of the road would require major reconstruction to meet passenger vehicle access standards.

Analysis:

The conclusion of the NSR 1006 report was that none of the 4 routes identified would provide reasonable and safe temporary and/or long-term access for the residents of Salt Flat. The reasons cited include the steepness of grades, narrowness of the road bed, the large amount of excavation required (much of it being in decomposed granitic soils), impact to private lands required for right-of-way, and acceptability to the users.

In an effort to provide an independent verification of the findings of the study, Trinity River Restoration Program (TRRP) conducted a field review on Feb 13, 2003. The results largely supported the views of the NSR 1006 report, especially for Routes 1 and 2 which exhibit the most difficult engineering and property constraints. Route 1 and 2 were removed from further consideration.

Route 3 and 4 would require major reconstructions in order to satisfy the primary objective identified by Trinity County in the Notice of Preparation, which is to provide reasonable and safe temporary and/or long-term access to the residents of Salt Flat. The minimum standards for access roads are listed in the Trinity County Fire Safe Standards (FSS). In addition, the roads must have the ability to provide access to service truck such as UPS, Fed Ex, propane delivery, etc., as well as to passenger vehicles. It was the conclusion of the TRRP however that the work required to bring these roads to standards was engineeringly feasible. The purpose of this document is to analyze these two routes in greater detail and to create preliminary engineering cost estimates for improvements.

Existing Conditions:

Figure 1. Typical existing road feature

Route 3 and 4 lie within that portion of the Trinity River watershed composed of loosely consolidated soils of which particularly are decomposed granite (DG) soils.

The Trinity County Decomposed Granite Grading Ordinance requires a grading permit from the Trinity County Transportation Department prior to construction of new roads or excavation in areas with decomposed granite soils, which includes the Shasta Batholith of decomposed granite soils. This ordinance applies only to private lands under the jurisdiction of Trinity County. It does not apply to federally managed lands.

Existing surfacing is generally native-materials with a few segments of a thin crushed-shale surface layer.

There are numerous18", 24", and 36" corrugated metal pipes (CMP) culvert crossings. A few of these culverts were plugged. Some drainage has no cross-drainage structures and would require culvert installation.

Muckawee Gulch Bridge may need to be retrofitted or replaced. It does not meet minimum width standards and the carrying capacity is unknown (Fig. 2).

Figure 2. Muckawee Gulch Bridge, approximately 0.9 miles from the entrance gate.

Other road features of design consideration include:

1) Several road segments have a grade exceeding 16%, the maximum allowed by the FSS.
2) Numerous road segments are less than the minimum required 18 foot roadway width in the FSS.
3) There are some degrading bank slopes.

Map of Route 3 & Route 4:

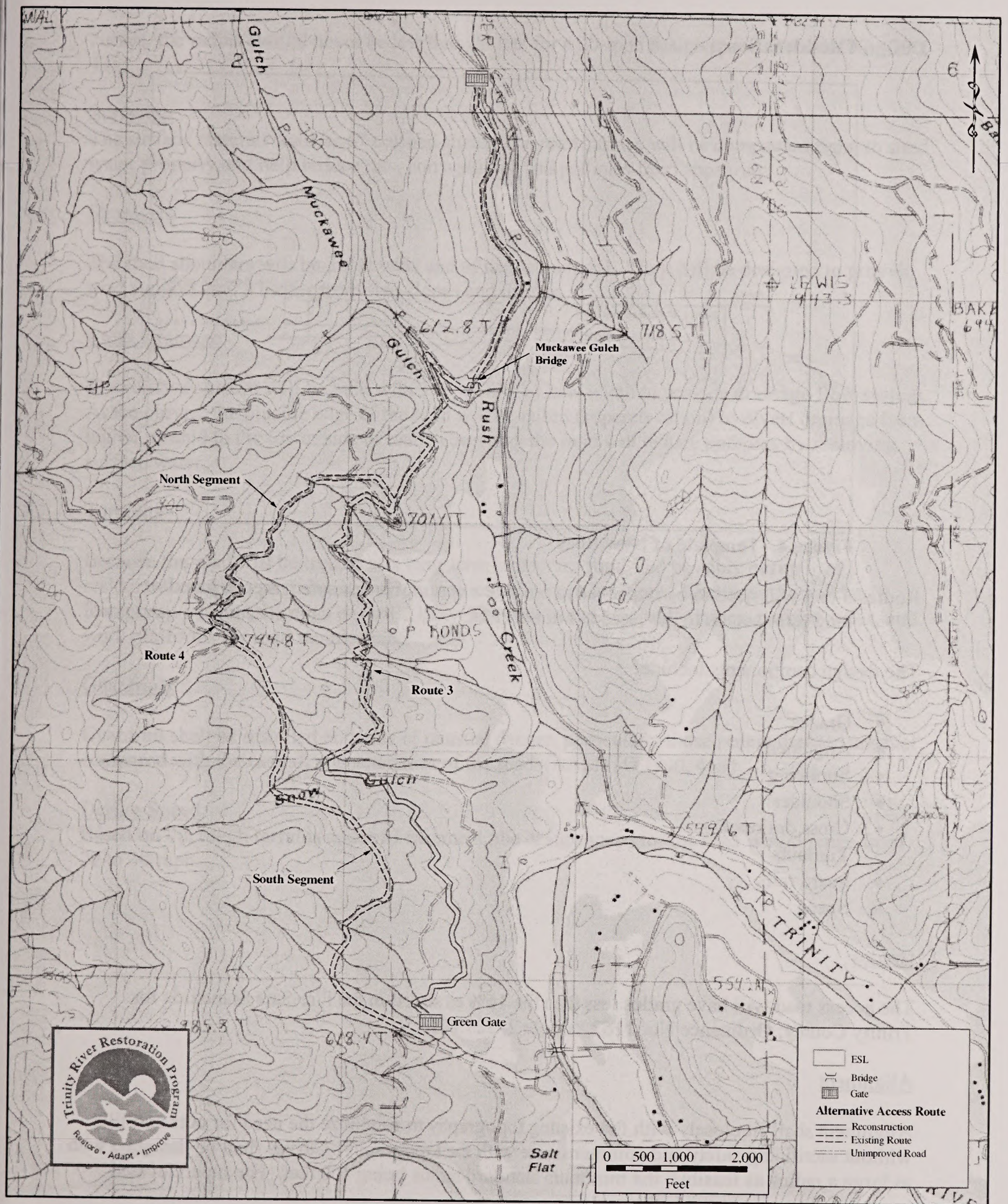

Figure 3. Route Map

Design Considerations:

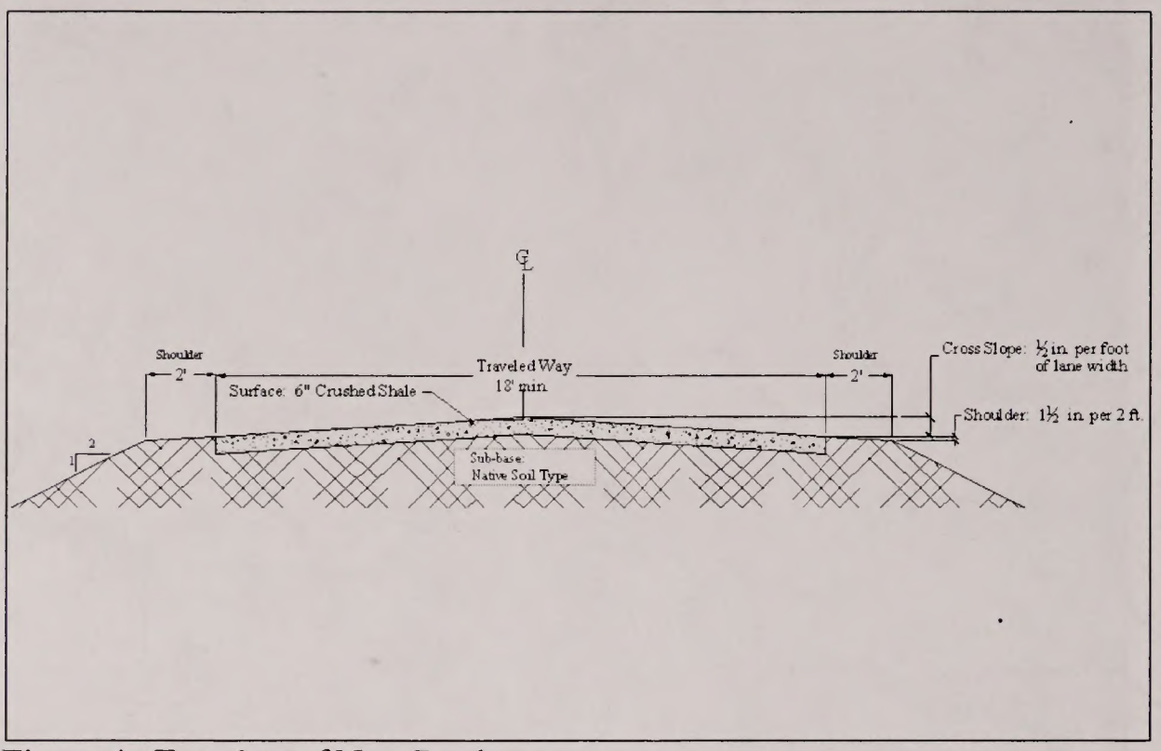

Figure 4. Template of New Road

Routes 3 or 4 will need to be improved to provide a reasonable and safe temporary and/or long-term access to the residents of Salt Flat.

The design components include:

- Grades
- Alignment
- Surfacing
- Shoulder
- Cross drainage
- Turnouts
- guard rails
- Speed

Grades

The access road will have grades less than the 16% as stated in the Fire Safe Standards for Trinity County, Ordinance No. 1162, Article 2, 1273.01.

Alignment

Alignment shall fit closely with the existing topography to minimize the need for cuts and fills without sacrificing safety and commensurate with the topography. Curves shall be designed with as large a radius as feasible; the minimum standard radius being 100 feet. For superelevated

curves, the radius should never be less than 75 feet for a 20-mph design speed. (AASHTO,1990, 435)

Surfacing

The surface material shall be 6" crushed shale. The road surface will be compacted tight to shed water properly and help reduce ruts, corrugations, and potholes from appearing.

Shoulders

The road shoulders will be 2 feet wide and of native material. They will be designed to provide road support, and a buffer from side-slopes and ditches.

Cross Drainage

The roadway crown will be built with 2% per foot of lane width to provide drainage flow system. At the curves, the outside edge of the road will be raised (superelevation) to divert drainage from higher ground to the lower side of road. Crowning the road will reduce potholes by removing surface water.

Turnouts

Because the road will be treated as a long-term temporary route and possibly permanent residential road access, turnouts will be required in certain locations. The turnouts will be 10 feet measured from the edge of traffic lane. They can serve as a safety zones, parking areas, and work platforms for road maintenance.

Guardrails

Guardrail shall be installed at points of unusual danger, particularly those points that are unusual compared with the overall characteristics of the road. (AASHTO,1990, 463)

Design Speed

Based on the rough terrains and road easement, the design speed for the road would range from 20 to 30 mph.

Costs to Build to Standards:

COSTS	ROUTE 3	ROUTE 4
Minor Cut & Fill ($5/yd^3)	$80,000.00	$85,000.00
Import or Export ($12/yd^3)	$70,000.00	$75,000.00
Gravel Road Base ($20/yd^3)	$40,000.00	$45,000.00
Slope > 16% ($12/yd^3)	$35,000.00	$35,000.00
Erosion Control / Re-vegetation (0.50/ft^2)	$150,000.00	$165,000.00
Drainage/Culverts (~$2000.00/each)	$16,000.00	$22,000.00
Muckawee Gulch Bridge Retrofit	$15,000.00	$15,000.00
Subtotal	$406,000.00	$442,000.00
Contingency (25%)	$507,500.00	$552,500.00

Table 1. Cost for Temporary Access Roads.

COSTS	ROUTE 3	ROUTE 4
Minor Cut & Fill ($5/yd^3)	$80,000.00	$85,000.00
Import or Export ($12/yd^3)	$70,000.00	$75,000.00
Gravel Road Base ($20/yd^3)	$40,000.00	$45,000.00
Slope > 16% ($12/yd^3)	$35,000.00	$35,000.00
Erosion Control / Re-vegetation (0.50/ft^2)	$150,000.00	$165,000.00
Drainage/Culverts (~$2000.00/each)	$16,000.00	$22,000.00
Muckawee Gulch Bridge Replacement	$250,000.00	$250,000.00
Subtotal	$641,000.00	$677,000.00
Contingency (25%)	$801,250.00	$846,250.00
Annual Maintenance	$20,000.00/yr	$30,000.00/yr

Table 2. Cost for Permanent Access Roads.

Other Considerations and Assumptions:

The construction of either route would require temporary or permanent easement from private landowners. Initial contacts indicated that the landowners may not be receptive.

Initial contacts with residents of Salt Flat indicate a lack of support for a permanent replacement of the existing bridge with an overland route.

It is assumed that the Muckawee Gulch Bridge would be retrofitted with guardrail and strengthen for the temporary access alternative. The Muckawee Gulch Bridge would be replaced in the permanent access alternative.

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MEMORANDUM

{tc \l1 "MEMORANDUM}

DATE: July 12, 2002

TO: Project File

FROM: Ed Solbos, Bureau of Reclamation
Brandt Gutermuth, Bureau of Land Management
Tom Stokely, Trinity County Planning Department
Paul Uncapher, North State Resources, Inc.

SUBJECT: Trinity River Bridges Project
Alternative Access to Salt Flat Review (NSR 10006)

Introduction

The need to provide temporary access to the Salt Flat residents as part of the Trinity River Bridges Project has been highlighted during the scoping process. As a result, representatives of the Lead Agencies identified several alternatives that may be available for temporary overland access. On June 6, 2002, a field review was conducted to evaluate alternative access routes. Review Team members included:

- Ed Solbos, Bureau of Reclamation
- Russ Smith, Bureau of Reclamation
- Denise Stotts, Bureau of Reclamation
- Brandt Gutermuth, Bureau of Land Management
- Tom Stokely, Trinity County
- Paul Uncapher, North State Resources, Inc.

The objectives of this review were:

- Evaluate the existing condition of each route
- Identify advantages and disadvantages of each route
- Discuss overall feasibility of routes

Three routes were evaluated during the initial site visit. The approximate locations of these routes are shown on the attached map. Route 1, was an existing road/trail from the Bucktail area north to Salt Flat. Route 2, was an existing road that connects Salt Flat to the Wright Ranch at the mouth of Rush Creek. Route 3, utilized an existing road system that initiates approximately three miles up Rush Creek road from the Rush Creek Delta site.

Subsequent to this trip, an additional route was identified by residents of Salt Flat and reviewed by members of the team on June 27, 2002. Participants included, Ed Solbos, Denise Stotts, Brandt Gutermuth and Paul Uncapher. This route has been identified as Route 4 in this document, and the attached map.

Route Evaluation

Route 1. Bucktail to Salt Flat subdivision

This route begins at the southwest corner of the Bucktail subdivision in the vicinity of the transmission access road and is approximately 1 mile in length. Although it connects to an established road immediately above the Salt Flat residential area, a locked gate prohibits vehicular access. This road is impassable for vehicles due to multiple landslides and fill failures. There is no evidence that this road has been used for a number of years.

This route is characterized by steep grades, with numerous sections over 12%. Road widths vary from 8 feet to 14 feet, with an average of 12 feet to the edge of the fill slope. Several sections are located on side slopes in excess of 70%, with cut slopes from 20-30 feet in height. The road surface is native material, with a high percentage of the route underlain by decomposed granitic soils. This road has a number of existing drainage structures associated with springs and intermittent streams. There is evidence that some maintenance has occurred along the northern section.

The advantages of this route include:

- Existing road prism from Bucktail to Salt Flat

The disadvantages of this route include:

- Requires access across private lands
- Existing width not suitable for traffic
- Would require substantial excavation to provide minimal width
- Excavation would decrease stability of cut slopes, particularly in areas of granitic soils
- Existing grade would limit vehicular access, particularly in adverse weather conditions
- Would require improvements in road drainage
- Excavation above the Bucktail Subdivision would be hazardous to certain homes due to rock fall potential
- Lack of surfacing would limit vehicular access, particularly in wet weather

Route 2. Salt Flat subdivision to Wright Ranch

This route begins approximately halfway up the Salt Flat road, and travels north along a roadbed connected to the Wright Ranch property. This route is about 1.0 mile in length and shows evidence of use from Salt Flat and the Wright Ranch on either end. There are locked gates that currently prevent vehicle access, although the Bureau of Land Management has an agreement with the NOR-EL-MUK NATION to manage the Salt Flat parcel in conjunction with their traditional use practices. In its present condition, this road is not passable. A large landslide associated with a stream crossing prohibits through traffic via this route.

This route is characterized by grades between 0 and 15%, although the average grade appeared to be less than 10 %. Road widths vary from 8 feet to 16 feet, with an average of 14 feet to the edge of the fill slope. The majority of the route is on slopes less than 60%. There are extensive sections that are located on highly weathered granitic soils, with extensive evidence of erosion. Cut slopes are 5-20 feet in height with numerous cut slope failures. The road surface is native material, although some sections show evidence of surfacing in the past. This road has a number of existing drainage structures associated with springs and streams. The large landslide on the north end of the route is associated with a stream crossing, with emerging groundwater down slope. This section is approximately 250 feet across, and appears to extend down slope for several hundred feet. There is evidence that some maintenance has occurred along this route in the past.

The advantages of this route include:

- Existing road prism from Salt Flat to Rush Creek
- Suitable grade for vehicular traffic with minor exceptions
- Existing width would provide for one lane traffic with occasional turnouts

The disadvantages of this route include:

- Requires access across private lands, including a landowner adamantly opposed to reopening the road
- This road would cross Rush Creek utilizing private bridge
- Potential sediment impacts to the Trinity River associated with reconstruction and use of this route
- Excavation would increase potential for erosion, particularly in granitic soils
- Lack of surfacing would limit vehicular access, particularly in wet weather
- Active landslide area would require stabilization measures to provide access
- Would require improvements in road drainage

Route 3. Rush Creek Road to Landing above BLM Salt Flat parcel

This route begins approximately 3 miles upstream from the Wright Ranch at a point where Rush Creek Road crosses Rush Creek. This route utilizes private timber company roads, with a locked gate at the beginning. Approximately 3.6 miles of road is accessible by high clearance vehicles under dry weather conditions. The useable road terminates at a landing, approximately 300 vertical feet above the Squaw Flat residential area. A series of logging roads and skid trails have been developed down the ridge, however grades are in excess of 15% with an average width of 10 feet. The review team estimated an additional .5 miles of major reconstruction would be required to connect this road system into the existing BLM road accessed through Salt Flat (green gate).

The drivable portion of this route is characterized by grades between 0 and 15%, although the average grade appeared to be less than 10 %. Grades in association with stream crossings were marginal for two wheel drive vehicles. Road widths vary from 14 feet to 24 feet, with an average width of 14 feet. Although there are sections located on steep side slopes in excess of 70%, the majority of the route is on slopes less than 60%. There are extensive sections that are located on highly weathered granitic soils, with extensive evidence of erosion. Cut slopes are 10-30 feet in height with some evidence of cut slope failures and surface erosion. The road surface is rocked with imported material, although the depth of surfacing is unknown. This road has a number of existing drainage structures associated with springs and streams.

The advantages of this route include:

- Existing road prism from Rush Creek road to the ridge above Salt Flat
- Suitable grade for vehicular traffic with minor exceptions on existing road system
- Existing width would provide for one lane traffic with occasional turnouts
- Road has been maintained to the landing above Salt Flat

The disadvantages of this route include:

- Requires access across private lands
- Require substantial reconstruction for .5 mile of lower road
- Some reconstruction required to address grade and erosion issues
- Route has sensitive granitic soils in a number of locations
- Surfacing may not be adequate for passenger vehicles, particularly in adverse weather conditions
- The roundabout route would take longer for residents to ingress and egress their property
- Potential impacts to river in association with major reconstruction above Salt Flat

Route 4. Rush Creek Road to Salt Flat Green Gate

This route begins approximately 3 miles upstream from the Wright Ranch at a point where Rush Creek Road crosses Rush Creek. This route utilizes private timber company roads similarly to Route 3 for approximately 1 mile. This route is about 4.4 miles long and requires a high clearance vehicle under dry conditions. The review team suggested that four-wheel drive would be required under wet conditions. This route has two unique segments with locked gates on either side.

The northern segment associated with Rush Creek is typical of low-standard roads that provide access for timber management activities. Grades on this segment are typically less than 10%, with road widths between 14 and 20 feet. Certain locations have surfacing, but the majority of this segment is native-surface construction on through metamorphic and granitic rock types.

The southern segment above Salt Flat is characterized by grades over 12% with some sections approaching 16%. This segment is constructed with a berm and is extensively water-barred. The average width is 12 feet, with localized cut slope failures that reduce width in some areas. This segment is predominantly built on highly weathered granitic rocks, and subject to severe rill and gully erosion in numerous locations. Numerous drainage features are intercepted by this road, and in many instances, active gully features were observed in or immediately below the fill slope. The review team estimated that as much as 2 miles of major reconstruction would be necessary to provide passenger vehicle access.

The advantages of this route include:

- Existing road prism from Rush Creek road to the Salt Flat road
- Suitable grade for high clearance vehicular traffic with minor exceptions on existing road system

The disadvantages of this route include:

- Requires access across private lands
- Requires major reconstruction for southern segment to provide passenger vehicle access
- Some reconstruction required to address grade and erosion issues on northern segment.
- Sensitive granitic soils throughout the route
- Native surface road would be subject to erosion, even during dry weather periods due to grade.
- Four-wheel drive may be required in the event of wet surface conditions (summer thunderstorms).
- Would increase the analysis area for the NEPA/CEQA process
- The roundabout route would take longer for residents to ingress and egress their property

Feasibility Assessment

After consideration of the aforementioned routes, the review team agreed that these routes would not meet the primary objective identified by Trinity County in the Notice of Preparation. The requirement to provide reasonable and safe temporary and/or long-term access to the residents of Salt Flat may be difficult to achieve. The ability to provide access to passenger vehicles, and service trucks (UPS, Fed Ex, propane delivery) on a daily basis for an extended period of time was a factor in this evaluation. Furthermore, the review team concurred that the affects associated with these routes may be prohibitive in terms of economics, natural resources and human values. The review team concluded that further consideration and evaluation of these routes was unreasonable and infeasible at this time.

APPENDIX L

CNDDB and CNPS Database Search Results

Appendix L

CNDDB & CNPS Summary

California Department of Fish and Game
Natural Diversity Data Base

Full Condensed Report Multiple Records per Page
Lewiston and Weaverville Quads

RANA BOYLII
FOOTHILL YELLOW-LEGGED FROG
Element Code: AAABH01050

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G3
State: S2S3

Other Lists
CDFG Status: SC

Habitat Associations

General: PARTLY-SHADED, SHALLOW STREAMS & RIFFLES WITH A ROCKY SUBSTRATE IN A VARIETY OF HABITATS.
Micro: NEED AT LEAST SOME COBBLE-SIZED SUBSTRATE FOR EGG-LAYING. NEED AT LEAST 15 WEEKS TO ATTAIN METAMORPHOSIS.

Occurrence No. 69 Map Index:24194 Dates Last Seen Lat/Long: 40 42'41" / 12250'02" Township: 99X
Occ Rank: Unknown Element: 1993-XX-XX UTM: Zone-10 N4506527 E514032 Range: 99X
Origin: Natural/Native occurrence Site: 1993-XX-XX Precision: SPECIFIC Section: XX Qtr XX
Presence: Presumed Extant Symbol Type: POLYGON Meridian: H
Trend: Unknown Area: 1,945.6 ac Elevation: 500 ft
Main Source: WELSH, H. & A. LIND 1993 (PERS)
Quad Summary: LEWISTON (4012267/649A)*, WEAVERVILLE (4012268/649B), JUNCTION CITY (4012361/650A), DEDRICK (4012371/668D), HELENA (4012372/668C)
County Summary: TRINITY
SNA Summary:
Location: TRINITY RIVER, BETWEEN THE LEWISTON DAM AND THE NORTH FORK OF THE TRINITY.
Comments
Distribution: ACCORDING TO WELSH AND LIND, FROGS ARE FOUND THROUGHOUT THIS AREA.
Ecological:
Threat:
General: NINE TADPOLES FOUND MAY-JUNE 1991; 51 TADS, 5 MALES, 3 FEMALES, AND 36 FROGS OF UNKNOWN SEX FOUND AUG 1991;15 TADS FOUND MAY-JUNE 1992; UNK NUMBER OF FROGS FOUND IN SURVEYS DONE IN 1993 BY WELSH AND LIND. SURVEYS WILL CONTINUE THROUGH 1994.
Owner/Manager: USFS-SHASTA/TRINITY NF

California Department of Fish and Game
Natural Diversity Data Base

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HALIAEETUS LEUCOCEPHALUS
BALD EAGLE
Element Code: ABNKC10010

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G4	CDFG Status:
State: Endangered	State: S2	

Habitat Associations

General: (NESTING & WINTERING) OCEAN SHORE, LAKE MARGINS, & RIVERS FOR BOTH NESTING & WINTERING. MOST NESTS WITHIN 1 MI OF WATER.
Micro: NESTS IN LG, OLD-GROWTH, OR DOMINANT LIVE TREE W/OPEN BRANCHES, ESPECIALLY PONDEROSA PINE. ROOSTS COMMUNALLY IN WINTER.

Occurrence No. 70 Map Index:08342 Dates Last Seen Lat/Long: 40 43'46" / 12247'35" Township: 33N
Occ Rank: Good Element: 1997-XX-XX UTM: Zone-10 N4508535 E517462 Range: 08W
Origin: Natural/Native occurrence Site: 1997-XX-XX Precision: NON-SPECIFIC Section: 08 Qtr NE
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Stable Radius: 1/10 mile Elevation: 2000 ft
Main Source: DEPT. OF FISH & GAME 1986 (PERS)
Quad Summary: LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: HATCHERY TERRITORY; LEWISTON RESERVOIR, IN THE VICINITY OF TRINITY RIVER FISH HATCHERY, NORTH OF LEWISTON.
Comments
Distribution: FORMERLY KNOWN AS JENNING'S GULCH/LEWISTON TERRITORY.
Ecological: NESTING TERRITORY.
Threat: PRIVATE LANDS ADJACENT TO THE NEST HAVE BEEN LOGGED AND MAY BE SUBDIVIDED.
General: DISCOVERED IN 1971. 1 FLEDGED, 1977. OCCUPIED/UNSUCCESSFUL, 1981. 1-2 FLEDGED YEARLY, 1982-89. STATUS UNKNOWN, 1990. UNOCCUPIED, 1991. OCCUPIED/UNSUCCESSFUL, 1992. 1 FLEDGED, 1993, 1994, 1995, & 1996. OCCUPIED/SUCCESS UNKNOWN, 1997.
Owner/Manager: PVT, USFS-SHASTA/TRINITY NF

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STRIX OCCIDENTALIS CAURINA
NORTHERN SPOTTED OWL
Element Code: ABNSB12011

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G3T3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: OLD-GROWTH FORESTS OR MIXED STANDS OF OLD-GROWTH & MATURE TREES. OCCASIONALLY IN YOUNGER FORESTS W/PATCHES OF BIG TREES.
Micro: HIGH, MULTISTORY CANOPY DOMINATED BY BIG TREES, MANY TREES W/CAVITIES OR BROKEN TOPS, WOODY DEBRIS & SPACE UNDER CANOPY.

Occurrence No. F91 Map Index:18585 Dates Last Seen Lat/Long: 40 37'00" / 12258'35" Township: 32N
Occ Rank: Unknown Element: 1989-06-06 UTM: Zone-10 N4495999 E501999 Range: 10W
Origin: Natural/Native occurrence Site: 1989-06-06 Precision: NON-SPECIFIC Section: 23 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 2500 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: HOOSIMBIM MTN. (4012258/649C)*, WEAVERVILLE (4012268/649B)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF INDIVIDUAL.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR206.
Owner/Manager: UNKNOWN

Occurrence No. F98 Map Index:18592 Dates Last Seen Lat/Long: 4038'05" / 122 59'17" Township: 32N
Occ Rank: Unknown Element: 1989-06-12 UTM: Zone-10 N4497999 E501000 Range: 10W
Origin: Natural/Native occurrence Site: 1989-06-12 Precision: NON-SPECIFIC Section: 15 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 2400 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: WEAVERVILLE (4012268/649B)*, JUNCTION CITY (4012361/650A)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF INDIVIDUAL.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR203.
Owner/Manager: UNKNOWN

Occurrence No. F99 Map Index:18593 Dates Last Seen Lat/Long: 4038'04" / 122 47'56" Township: 32N
Occ Rank: Unknown Element: 1990-08-23 UTM: Zone-10 N4497999 E516999 Range: 08W
Origin: Natural/Native occurrence Site: 1990-08-23 Precision: NON-SPECIFIC Section: 17 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 3800 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF YOUNG.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR276.
Owner/Manager: UNKNOWN

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Natural Diversity Data Base

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Lewiston and Weaverville Quads

STRIX OCCIDENTALIS CAURINA (cont.)
NORTHERN SPOTTED OWL
Element Code: ABNSB12011

List Status: Federal: Threatened; State: None
NDDB Element Ranks: Global: G3T3; State: S2S3
Other Lists: CDFG Status: SC

Occurrence No. G07 Map Index:18600
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: WEAVERVILLE (4012268/649B)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF INDIVIDUAL.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR207.
Owner/Manager: UNKNOWN

Dates Last Seen
Element: 1989-06-09
Site: 1989-06-09

Lat/Long: 4038'37" / 122 57'10"
UTM: Zone-10 N4498999 E504000
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile

Township: 32N
Range: 10W
Section: 13 Qtr XX
Meridian: M
Elevation: 1800 ft

Occurrence No. G17 Map Index:18610
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF PAIR.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR217.
Owner/Manager: UNKNOWN

Dates Last Seen
Element: 1990-06-29
Site: 1990-06-29

Lat/Long: 4039'42" / 122 51'29"
UTM: Zone-10 N4501000 E511999
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile

Township: 32N
Range: 09W
Section: 03 Qtr XX
Meridian: M
Elevation: 2900 ft

Occurrence No. G31 Map Index:18624
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: WEAVERVILLE (4012268/649B)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF YOUNG.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR079.
Owner/Manager: UNKNOWN

Dates Last Seen
Element: 1980-08-05
Site: 1980-08-05

Lat/Long: 4040'47" / 122 54'19"
UTM: Zone-10 N4502999 E508000
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile

Township: 33N
Range: 09W
Section: 32 Qtr XX
Meridian: M
Elevation: 2100 ft

California Department of Fish and Game
Natural Diversity Data Base

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STRIX OCCIDENTALIS CAURINA (cont.)
NORTHERN SPOTTED OWL
Element Code: ABNSB12011

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G3T3	CDFG Status: SC
State: None	State: S2S3	

Occurrence No. G32 Map Index:18625 Dates Last Seen Lat/Long: 4040'47" / 122 47'56" Township: 33N
Occ Rank: Unknown Element: 1982-05-XX UTM: Zone-10 N4502999 E516999 Range: 08W
Origin: Natural/Native occurrence Site: 1982-05-XX Precision: NON-SPECIFIC Section: 29 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 3000 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF INDIVIDUAL.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR080.
Owner/Manager: UNKNOWN

Occurrence No. G74 Map Index:18667 Dates Last Seen Lat/Long: 4045'06" / 122 48'38" Township: 33N
Occ Rank: Unknown Element: 1981-02-17 UTM: Zone-10 N4510999 E516000 Range: 08W
Origin: Natural/Native occurrence Site: 1981-02-17 Precision: NON-SPECIFIC Section: 06 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 2400 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: TRINITY DAM (4012277/667D)*, LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF INDIVIDUAL.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR039.
Owner/Manager: UNKNOWN

Occurrence No. G75 Map Index:18668 Dates Last Seen Lat/Long: 4045'06" / 122 45'04" Township: 34N
Occ Rank: Unknown Element: 1989-06-06 UTM: Zone-10 N4511000 E521000 Range: 08W
Origin: Natural/Native occurrence Site: 1989-06-06 Precision: NON-SPECIFIC Section: 34 Qtr XX
Presence: Presumed Extant Symbol Type: POINT Meridian: M
Trend: Unknown Radius: 3/5 mile Elevation: 2500 ft
Main Source: GOULD, G. 1991 CDFG SPOTTED OWL DATABASE
Quad Summary: TRINITY DAM (4012277/667D)*, FRENCH GULCH (4012266/648B), LEWISTON (4012267/649A), PAPOOSE CREEK (4012276/666C)
County Summary: TRINITY
SNA Summary:
Location: SEE LIST OF QUADS.
Comments
Distribution:
Ecological: NESTING TERRITORIES BASE ON OBSERVATION OF PAIR.
Threat: TIMBER HARVEST.
General: NESTING TERRITORY NUMBER(S) = TR153.
Owner/Manager: UNKNOWN

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ONCORHYNCHUS TSHAWYTSCHA SPRING-RUN
SPRING-RUN CHINOOK SALMON
Element Code: AFCHA0205A

List Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G5	CDFG Status:
State: Threatened	State: S1	

Habitat Associations

General: ADULT NOS DEPEND ON POOL DEPTH & VOLUME, AMOUNT OF COVER, & PROXIMITY TO GRAVEL. WATER TEMPS >27 C LETHAL TO ADULTS
Micro: FEDERAL LISTING REFERS TO POPS SPAWNING IN SACRAMENTO RIVER & TRIBUTARIES.

Occurrence No. 16 Map Index:24194 Dates Last Seen Lat/Long: 40 42'41" / 12250'02" Township: 99X
Occ Rank: Unknown Element: 1993-11-XX UTM: Zone-10 N4506527 E514032 Range: 99X
Origin: Natural/Native occurrence Site: 1993-11-XX Precision: SPECIFIC Section: XX Qtr XX
Presence: Presumed Extant Symbol Type: POLYGON Meridian: H
Trend: Unknown Area: 1,945.6 ac Elevation: 500 ft
Main Source: DEPT. OF FISH & GAME 1996 (LIT)
Quad Summary: LEWISTON (4012267/649A)*, WEAVERVILLE (4012268/649B), JUNCTION CITY (4012361/650A), DEDRICK (4012371/668D), HELENA (4012372/668C)
County Summary: TRINITY
SNA Summary:
Location: TRINITY RIVER, LEWISTON DAM TO CONFLUENCE WITH NORTH FORK TRINITY.
Comments
Distribution: BELOW LEWISTON DAM DOWNSTREAM TO THE MOUTH OF THE NORTH FORK TRINITY.
Ecological: NORTH COAST RIVER. SPAWING HABITAT MAPPED.
Threat:
General: 1993, MEASURED 268 CARCASSES, ADULTS COMPOSED 98.1%, GRILSE 1.9%. LENGTH RANGE 41 TO 97 CM FORK LENGTH.
Owner/Manager: PVT, BLM, USFS-TRINITY NF

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MARTES PENNANTI PACIFICA
PACIFIC FISHER
Element Code: AMAJF01021

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G5T3T4
State: S2S3

Other Lists
CDFG Status: SC

Habitat Associations

General: INTERMEDIATE TO LARGE-TREE STAGES OF CONIFEROUS FORESTS & DECIDUOUS-RIPARIAN AREAS W/ HIGH PERCENT CANOPY CLOSURE.
Micro: USE CAVITIES, SNAGS, LOGS & ROCKY AREAS FOR COVER & DENNING. NEED LARGE AREAS OF MATURE, DENSE FOREST.

Occurrence No. 347 Map Index:08102 Dates Last Seen
Occ Rank: Unknown Element: XXXX-XX-XX
Origin: Natural/Native occurrence Site: XXXX-XX-XX
Presence: Presumed Extant
Trend: Unknown
Lat/Long: 40 44'37" / 12256'30"
UTM: Zone-10 N4510086 E504924
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 33N
Range: 10W
Section: 01 Qtr XX
Meridian: M
Elevation: 2300 ft
Main Source: DEPT. OF FISH & GAME 1987 (OBS)
Quad Summary: WEAVERVILLE (4012268/649B)*, RUSH CREEK LAKES (4012278/667C)
County Summary: TRINITY
SNA Summary:
Location: GARDEN GULCH, ONE MI N OF WEAVERVILLE, TRINITY NATL FOREST.
Comments
Distribution:
Ecological: MIXED CONIFEROUS FOREST HABITAT.
Threat:
General: OBSERVATION; DATE UNKNOWN.
Owner/Manager: USFS-SHASTA/TRINITY NF

Occurrence No. 376 Map Index:30310 Dates Last Seen
Occ Rank: Good Element: 1994-02-12
Origin: Natural/Native occurrence Site: 1994-02-12
Presence: Presumed Extant
Trend: Unknown
Lat/Long: 4038'28" / 122 44'54"
UTM: Zone-10 N4498725 E521279
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 32N
Range: 08W
Section: 10 Qtr SE
Meridian: M
Elevation: 2960 ft
Main Source: HUGHES, K. 1994 (OBS)
Quad Summary: FRENCH GULCH (4012266/648B)*, LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: VICINITY OF LITTLE GRASS VALLEY CREEK, 1 MILE WNW OF BUCKHORN SUMMIT, IN THE TRINITY MOUNTAINS.
Comments
Distribution:
Ecological: HABITAT CONSISTS OF DOUGLAS FIR FOREST THAT WAS LOGGED >30 YEARS AGO; AVERAGE DBH ON-SITE >20 INCHES, WITH AN AVERAGE CANOPY COVER >60%.
Threat:
General: 1 ADULT OBSERVED ON 12 FEBRUARY 1994.
Owner/Manager: BLM

Occurrence No. 394 Map Index:33658 Dates Last Seen
Occ Rank: Excellent Element: 1997-01-21
Origin: Natural/Native occurrence Site: 1997-01-21
Presence: Presumed Extant
Trend: Unknown
Lat/Long: 4039'50" / 122 58'09"
UTM: Zone-10 N4501228 E502599
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 32N
Range: 10W
Section: 02 Qtr NW
Meridian: M
Elevation: 1950 ft
Main Source: HUGHES, K. 1997 (OBS)
Quad Summary: WEAVERVILLE (4012268/649B)
County Summary: TRINITY
SNA Summary:
Location: JUST WEST OF TRINITY RIVER, 1.5 MILES NW OF DOUGLAS CITY CAMPGROUND, 4 MILES SSW OF WEAVERVILLE.
Comments
Distribution:
Ecological: HABITAT CONSISTS OF MIXED CONIFER FOREST THAT HAS NEVER BEEN HARVESTED.
Threat: THREATENED BY TIMBER HARVEST.
General: 1 ADULT DETECTED VIA REMOTE CAMERA ON 21 JANUARY 1997.
Owner/Manager: BLM

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CLEMMYS MARMORATA MARMORATA
NORTHWESTERN POND TURTLE
Element Code: ARAAD02031

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G4T4
State: S3

Other Lists
CDFG Status: SC

Habitat Associations

General: ASSOCIATED WITH PERMANENT OR NEARLY PERMANENT WATER IN A WIDE VARIETY OF HABITATS.
Micro: REQUIRES BASKING SITES. NESTS SITES MAY BE FOUND UP TO 0.5 KM FROM WATER.

Occurrence No. 11 Map Index:24194
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WELSH, H. & A. LIND 1993 (PERS)
Quad Summary: LEWISTON (4012267/649A)*, WEAVERVILLE (4012268/649B), JUNCTION CITY (4012361/650A), DEDRICK (4012371/668D), HELENA (4012372/668C)
County Summary: TRINITY
SNA Summary:
Location: TRINITY RIVER, BETWEEN THE LEWISTON DAM AND THE NORTH FORK OF THE TRINITY.
Comments
Distribution:
Ecological:
Threat:
General: FOUND, MARKED, AND RELEASED: 52 MALES, 66 FEMALES, & 20 UNKNOWN SEX JUNE-JULY 1991; 43 M, 42 F, 10 UNK SEX APR-SEP 1992; 6 M, 15 F FITTED WITH TRANSMITTERS MAY-AUG 1992; UNK NUMBER FOUND IN 1993 BY WELSH AND LIND.
Owner/Manager: USFS-SHASTA/TRINITY NF

Dates Last Seen
Element: 1993-XX-XX
Site: 1993-XX-XX

Lat/Long: 40 42'41" / 12250'02"
UTM: Zone-10 N4506527 E514032
Precision: SPECIFIC
Symbol Type: POLYGON
Area: 1,945.6 ac

Township: 99X
Range: 99X
Section: XX Qtr XX
Meridian: H
Elevation: 500 ft

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CAREX HYSTERICINA
BOTTLEBRUSH SEDGE
Element Code: PMCYP036D0

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G5
State: S1.1

Other Lists
CNPS List: 2
R-E-D Code: 3-3-1

Habitat Associations

General: MARSHES AND SWAMPS. IN CALIFORNIA, ONLY REPORTED FROM TRINITY COUNTY, NEAR RUSH CREEK.
Micro: WET PLACES, SUCH AS STREAM EDGES. 610M.

Occurrence No. 1 Map Index:35194 Dates Last Seen Lat/Long: 40 45'08" / 12250'23" Township: 33N
Occ Rank: Unknown Element: 1914-06-14 UTM: Zone-10 N4511062 E513518 Range: 09W
Origin: Natural/Native occurrence Site: 1914-06-14 Precision: NON-SPECIFIC Section: 01 Qtr W
Presence: Presumed Extant Symbol Type: POLYGON Meridian: H
Trend: Unknown Area: 174.3 ac Elevation: 2000 ft
Main Source: YATES #7-146 CAS #710189 (HERB)
Quad Summary: TRINITY DAM (4012277/667D)*, LEWISTON (4012267/649A)
County Summary: TRINITY
SNA Summary:
Location: RUSH CREEK, TRINITY FOREST.
Comments
Distribution: COLLECTED AT 2000' ELEVATION. MAPPED BY CNDDB ALONG STRETCH OF CREEK SSW OF TYLERS PEAK.
Ecological: WET MEADOW ASSOCIATED WITH SEDGES AND MIMULUS.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1914 COLLECTION BY YATES.
Owner/Manager: USFS-SHASTA/TRINITY NF

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JUNCUS DUDLEYI
DUDLEY'S RUSH
Element Code: PMJUN01390

List Status
Federal: None
State: None

NDDB Element Ranks
Global: G5
State: S2.3?

Other Lists
CNPS List: 2
R-E-D Code: 3-1-1

Habitat Associations

General: LOWER MONTANE CONIFEROUS FOREST (MESIC).
Micro: WET AREAS IN FOREST. 455-2000M.

Occurrence No. 1 Map Index:37368
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: KLUBERGER SN CAS #166633 (HERB)
Quad Summary: WEAVERVILLE (4012268/649B)
County Summary: TRINITY
SNA Summary:
Location: WEAVERVILLE, ALONG WATERCOURSE.
Comments
Distribution:
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1879 COLLECTION BY KLUBERGER. ORIGINAL DETERMINATION WAS JUNCUS COULTERI; ANNOTATED TO JUNCUS TENUIS VAR. DUDLEYI.
Owner/Manager: UNKNOWN

Dates Last Seen
Element: 1879-09-20
Site: 1879-09-20

Lat/Long: 4043'59" / 122 56'21"
UTM: Zone-10 N4508915 E505146
Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 33N
Range: 09W
Section: 07 Qtr XX
Meridian: M
Elevation: 2000 ft

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ALLIUM HOFFMANII
"Beegum onion"
Family: Liliaceae

Life Form: Perennial herb (bulbiferous)
Blooms: June-July
CNPS List: [4] Limited distribution
R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Shasta, Tehama, Trinity
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 1,100-1,800 m.
Notes: See Plant Life 28:63 (1972) for original description.

ALLIUM SISKIYOUENSE
"Siskiyou onion"
Family: Liliaceae

Life Form: Perennial herb (bulbiferous)
Blooms: May-July
CNPS List: [4] Limited distribution
R-E-D: 1-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest, Upper montane coniferous forest / rocky, sometimes serpentinite
Elevation: 900-2,500 m.

ARABIS MACDONALDIANA
"McDonald's rock cress"
Family: Brassicaceae

Life Form: Perennial herb
Blooms: May-July
CNPS List: [1B] R/T/E in CA and elsewhere
R-E-D: 2-3-2
State: [CE] State listed as Endangered (07/79)
Federal: [FE] Federally listed as Endangered (09/28/78)
Counties: Del Norte, Mendocino, Siskiyou, Trinity, Oregon
Quads: Noble Butte (600B), Salmon Mtn. (686B), Polar Bear Mtn. (738A), Broken Rib Mtn. (738B), Devils Punchbowl (738C), Preston Peak (738D), High Plateau Mtn. (739B), Gasquet (739C), High Divide (740A)
Habitat: Lower montane coniferous forest, North Coast coniferous forest, Upper montane coniferous forest / serpentinite
Elevation: 135-1,800 m.
Notes: Threatened by mining. Endangered in OR, where plant needs taxonomic study. Protected in part at Red Mtn. ACEC (BLM), MEN Co. Includes A. serpentinicola. See Rhodora 43(511):350 (1941) for taxonomic treatment, and Contributions from the Gray Herbarium 204:149-154 (1973) for taxonomic information.

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ARABIS MODESTA
"modest rock cress"
Family: Brassicaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Napa, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Lower montane coniferous forest
Elevation: 120-800 m.
Blooms: March-July
R-E-D: 1-1-2
Notes: Intergrades with A. oregana in SIS Co.; may be a variety of that plant. Endangered in OR. See Rhodora 43(511):350-352 (1941) for taxonomic treatment, and Contributions from the Gray Herbarium 204:149-154 (1973) for taxonomic information.

ARABIS OREGANA
"Oregon rock cress"
Family: Brassicaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Lake, Modoc, Napa, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Lower montane coniferous forest / serpentinite
Elevation: 600-1,830 m.
Blooms: May
R-E-D: 1-1-1
Notes: Many collections in Klamath region. Exact taxonomic status of NAP Co. occurrence needs to be determined. See Rhodora 43(511):349-350 (1941) for taxonomic treatment, and Contributions from the Gray Herbarium 204:149-154 (1973) for taxonomic information.

ARCTOSTAPHYLOS MALLORYI
"Mallory's manzanita"
Family: Ericaceae

Life Form: Shrub (evergreen)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Shasta, Trinity
Habitat: Chaparral, Lower montane coniferous forest / volcanic
Elevation: 800-1,200 m.
Blooms: April-July
R-E-D: 1-1-3
Notes: To be expected in GLE and TEH counties. See Four Seasons 6(4):23 (1983) for original description and 9(2):54-59 (1992) for revised nomenclature.

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ARNICA CERNUA
"serpentine arnica"
Family: Asteraceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 500-1,920 m.
Notes: Possibly threatened by logging.
Blooms: April-July
R-E-D: 1-1-2

ARNICA SPATHULATA
"Klamath arnica"
Family: Asteraceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 1,000-1,800 m.
Blooms: May-August
R-E-D: 1-1-2

ARNICA VENOSA
"Shasta County arnica"
Family: Asteraceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Trinity
Habitat: Cismontane woodland, Lower montane coniferous forest / often in disturbed areas
Elevation: 400-1,490 m.
Notes: Threatened by logging. Some plants seem intermediate to A. discoidea.
Blooms: May-June
R-E-D: 1-2-3

ASCLEPIAS SOLANOANA
"serpentine milkweed"
Family: Asclepiadaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Glenn, Lake, Mendocino, Napa, Shasta, Sonoma, Tehama, Trinity, Yolo
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest / serpentinite
Elevation: 230-1,860 m.
Notes: Not common where it occurs. Threatened by grazing, vehicles, logging, mining, and geothermal development. See Proceedings of the American Academy of Arts and Sciences 10:76 (1874) for original description, and Madrono 24(3):159-177 (1977) for information on floral ecology.
Blooms: May-August
R-E-D: 1-2-3

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ASTRAGALUS RATTANII VAR. RATTANII
"Rattan's milk-vetch"
Family: Fabaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Glenn, Humboldt, Lake, Mendocino, Sonoma, Tehama, Trinity
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest / gravelly streambanks
Elevation: 30-825 m.
Notes: See Systematic Botany 17(3):367-379 (1992) for distributional information.
Blooms: April-July
R-E-D: 1-1-3

CALYPTRIDIUM QUADRIPETALUM
"four-petaled pussypaws"
Family: Portulacaceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Glenn, Lake, Napa, Sonoma, Tehama, Trinity
Habitat: Chaparral, Lower montane coniferous forest / sandy or gravelly, usually serpentinite
Elevation: 315-2,040 m.
Notes: Threatened by vehicles. See Proceedings of the American Academy of Arts and Sciences 20:356 (1885) for original description.
Blooms: April-June
R-E-D: 1-1-3

CAREX GIGAS
"Siskiyou sedge"
Family: Cyperaceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Plumas, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest, Meadows, Upper montane coniferous forest / mesic, sometimes serpentinite seeps
Elevation: 710-2,345 m.
Notes: Endangered in OR.
Blooms: May-July
R-E-D: 1-1-2

CAREX HYSTERICINA
"bottlebrush sedge"
Family: Cyperaceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [2] R/T/E in CA, but more common elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Trinity, Arizona, Idaho, Oregon, Washington, widespread outside of California
Quads: Lewiston (649A), Trinity Dam (667D)
Habitat: Marshes and Swamps (streambanks)
Elevation: 610 m.
Notes: Known in CA only from Rush Creek. Endangered in OR, and state-listed as Sensitive in WA.
Blooms: June
R-E-D: 3-3-1

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CAREX LEPTALEA
"flaccid sedge"
Family: Cyperaceae

Life Form: Perennial herb (rhizomatous)
Blooms: May-July
CNPS List: [2] R/T/E in CA, but more common elsewhere
R-E-D: 3-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Marin [extirpated], Trinity, Idaho, Oregon, widespread outside of California
Quads: Drakes Bay (485C) [extirpated], Fields Landing (654B), Trinity Center (666B), Rodgers Peak (689A), Trinidad (689C), Cant Hook Mtn. (722B)
Habitat: Bogs and fens, Meadows (mesic), Marshes and Swamps
Elevation: 0-700 m.
Notes: Apparently extirpated in MRN Co. by wetland conversion. Sensitive in ID.

CAREX VULPINOIDEA
"fox sedge"
Family: Cyperaceae

Life Form: Perennial herb
Blooms: May-June
CNPS List: [2] R/T/E in CA, but more common elsewhere
R-E-D: 2-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Shasta, Siskiyou, Tehama, Trinity, Arizona, Oregon, widespread outside of California
Quads: Palermo (560A), Ord Ferry (577B), Llano Seco (577C), Foster Island (594D), Balls Ferry (628B), Bend (628C), Cottonwood (629A), Copco (733A)
Habitat: Marshes and Swamps (freshwater), Riparian woodland
Elevation: 30-1,200 m.
Notes: Need quads for SIS and TRI counties.

CHAENACTIS SUFFRUTESCENS
"Shasta chaenactis"
Family: Asteraceae

Life Form: Perennial herb
Blooms: May-September
CNPS List: [1B] R/T/E in CA and elsewhere
R-E-D: 2-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity
Quads: Thurston Peaks (668B), Dunsmuir (682A), Seven Lakes Basin (682B), Tangle Blue Lake (683B), Carrville (683C), Caribou Lake (684C), Cecilville (685B), Cecil Lake (685C), Mt. Shasta (698B), McCloud (698C), Weed (699B), Mount Eddy (699C), City Of Mount Shasta (699D), China Mtn. (700A), South China Mtn. (700D), Etna (701B), Solomons Temple (716A), Gazelle (717D) [?], Greenview (718C), Fort Jones (718D), Copco (733A)
Habitat: Lower montane coniferous forest, Upper montane coniferous forest / sandy, serpentinite
Elevation: 760-2,800 m.
Notes: Rare on the Shasta-Trinity NF. Possibly threatened by development.

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CLARKIA BOREALIS SSP. BOREALIS
"northern clarkia"

Family: Onagraceae

Life Form: Annual herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Trinity
Quads: Goose Gap (664A), Devils Rock (664D), Lamoine (665B), O'Brien (665D), Grizzly Peak (680B), Big Bend (680C), Shoeinhorse Mtn. (681D)
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest
Elevation: 400-1,340 m.
Notes: Known only from fewer than twenty occurrences. Need quads for TRI Co. See Canadian Journal of Botany 49:1211-1217 (1971) for taxonomic revision.

Blooms: June-September
R-E-D: 2-1-3

COLLOMIA TRACYI
"Tracy's collomia"

Family: Polemoniaceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Lassen, Siskiyou, Tehama, Trinity
Habitat: Lower montane coniferous forest
Elevation: 300-2,100 m.
Notes: Similar to C. tinctoria, but does not intergrade.

Blooms: June-July
R-E-D: 1-1-3

CYPRIPEDIUM CALIFORNICUM
"California lady's-slipper"

Family: Orchidaceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Del Norte, Humboldt, Mendocino, Marin [extirpated], Plumas, Shasta, Siskiyou, Sonoma, Trinity, Oregon
Habitat: Bogs and fens, Lower montane coniferous forest / seeps and streambanks, usually serpentinite
Elevation: 30-2,750 m.
Notes: Threatened by horticultural collecting and logging. Many protected populations on USFS land not reproducing. On watch list in OR. See Proceedings of the American Academy of Arts and Sciences 7:389 (1868) for original description, and Fremontia 17(2):17-19 (1989) and The Wild Orchids of California, p. 62-64 (1995) by R. Coleman for species accounts.

Blooms: April-August
R-E-D: 1-2-2

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CYPRIPEDIUM FASCICULATUM
"clustered lady's-slipper" Family: Orchidaceae

Life Form: Perennial herb (rhizomatous) Blooms: March-July
CNPS List: [4] Limited distribution R-E-D: 1-2-2
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Del Norte, Humboldt, Nevada, Plumas, Santa Clara, Santa Cruz [extirpated], Shasta, Sierra, Siskiyou, San Mateo, Tehama, Trinity, Yuba, Idaho, Oregon, Utah, Washington, Wyoming, and other states
Habitat: Lower montane coniferous forest, North Coast coniferous forest / usually serpentinite seeps and streambanks
Elevation: 100-2,435 m.
Notes: Widely scattered, but most occurrences small. Not seen recently in SCL or SMT counties. Threatened by logging and horticultural collecting. . Monitoring needed for protected populations on USFS lands to assess reproduction, which may be inadequate. Threatened in ID, candidate for state listing in OR, and state-listed as Threatened in WA. See Proceedings of the American Academy of Arts and Sciences 17:380 (1882) for original description, Lindleyana 2(1):553-57 (1987) for distributional information, and Fremontia 17(2):17-19 (1989) and The Wild Orchids of California, p. 65-68 (1995) by R. Coleman for species accounts.

CYPRIPEDIUM MONTANUM
"mountain lady's-slipper" Family: Orchidaceae

Life Form: Perennial herb (rhizomatous) Blooms: March-August
CNPS List: [4] Limited distribution R-E-D: 1-2-2
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Glenn, Humboldt, Madera, Mendocino, Modoc, Mariposa, Plumas, Santa Cruz [?], Shasta, Sierra, Siskiyou, San Mateo [?], Sonoma, Tehama, Trinity, Tuolumne, Idaho, Oregon, Washington, Wyoming, widespread outside of California
Habitat: Broadleafed upland forest, Cismontane woodland, Lower montane coniferous forest, North Coast coniferous forest
Elevation: 185-2,225 m.
Notes: Widely scattered, but most occurrences small. Many protected populations on USFS land not reproducing. Threatened by logging and horticultural collecting. On watch list in OR. See Fremontia 17(2):17-19 (1989) and The Wild Orchids of California, p. 69-72 (1995) by R. Coleman for species accounts.

DARLINGTONIA CALIFORNICA
"California pitcherplant" Family: Sarraceniaceae

Life Form: Perennial herb (rhizomatous) Blooms: April-July
CNPS List: [4] Limited distribution R-E-D: 1-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Del Norte, Nevada, Plumas, Shasta, Sierra, Siskiyou, Trinity, Yuba, Oregon
Habitat: Bogs and fens, Meadows / mesic, generally serpentinite seeps
Elevation: 0-2,585 m.
Notes: Threatened by horticultural collecting and mining. On watch list in OR.

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DARLINGTONIA CALIFORNICA (cont.)
See Fremontia 14(2):18 (1986) for habitat information.

EPILOBIUM OREGANUM
"Oregon fireweed" Family: Onagraceae

Life Form: Perennial herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Blooms: June-September
R-E-D: 2-2-2
Counties: Del Norte, El Dorado, Glenn, Humboldt, Mendocino, Shasta, Siskiyou, Tehama, Trinity, Oregon
Quads: Pyramid Peak (523C), Echo Lake (523D), Plaskett Meadows (581A), Mendocino Pass (597C), Leech Lake Mtn. (598A), Dubakella Mtn. 15' NE (632A), Dubakella Mtn. 15' SE (632D), Forest Glen (633D), Black Lassic (634D), Sims Mountain (652A), Board Camp Mtn. (652B), Mad River Buttes (653A), Iaqua Buttes (653B), Trinity Center (666B), Covington Mill (667A), Siligo Peak (667B), Denny (669B), Ironside Mtn. (669C), Willow Creek (670B), Grouse Mtn. (670C), Dunsmuir (682A), Ycatapom Peak (684D), Youngs Peak (686A), Salmon Mtn. (686B), Trinity Mtn. (686C), Mount Eddy (699C), City Of Mount Shasta (699D) [extirpated], Orleans Mtn. (703C), Ukonom Mtn. (720C), Ukonom Lake (720D), Chimney Rock (721C), Dillon Mtn. (721D), Buckhorn Bally (735A), Shelly Creek Ridge (739A)
Habitat: Bogs and fens, Lower montane coniferous forest, Upper montane coniferous forest / mesic
Elevation: 500-2,240 m.
Notes: Unable to confirm many historical occurrences on Shasta-Trinity NF; is it more common elsewhere? Threatened by logging. Known from fewer than 1000 plants at about twenty localities in OR, where candidate for state listing. See Pittonia 1:255 (1888) for original description.

ERIGERON CERVINUS
"Siskiyou daisy" Family: Asteraceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Blooms: June-August
R-E-D: 1-1-2
Counties: Del Norte, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest, Meadows
Elevation: 25-1,900 m.
Notes: Includes E. delicatus. Endangered in OR.

ERIGERON DECUMBENS VAR. ROBUSTIOR
"robust daisy" Family: Asteraceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Blooms: June-July
R-E-D: 1-1-3
Counties: Humboldt, Mendocino, Trinity
Habitat: Lower montane coniferous forest, Meadows / sometimes serpentinite
Elevation: 200-610 m.
Notes: See Madrono 35(2):81-82 (1988) for taxonomic treatment.

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ERIOGONUM CONGDONII
"Congdon's buckwheat" Family: Polygonaceae

Life Form: Shrub (deciduous) Blooms: June-August
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Siskiyou, Trinity
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 1,000-2,345 m.
Notes: See Aliso 7(2):220 (1970) for original description, and Phytologia 66(4):349 (1989) for taxonomic treatment.

ERIOGONUM SISKIYOUENSE
"Siskiyou buckwheat" Family: Polygonaceae

Life Form: Perennial herb Blooms: June-September
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity
Habitat: Lower montane coniferous forest (rocky, often serpentinite)
Elevation: 970-2,740 m.
Notes: See Bulletin of the Torrey Botanical Club 25:44 (1898) for original description, and Phytologia 66(4):348 (1989) for taxonomic treatment.

ERIOGONUM STRICTUM VAR. GREENEI
"Greene's buckwheat" Family: Polygonaceae

Life Form: Perennial herb Blooms: July-September
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Mendocino, Siskiyou, Tehama, Trinity
Habitat: Lower montane coniferous forest (serpentinite, rocky)
Elevation: 800-2,100 m.
Notes: See Proceedings of the American Academy of Arts and Sciences 12:83 (1870) for original description, and Phytologia 40:467 (1978) for revised nomenclature and 66(4):337-338 (1989) for taxonomic treatment.

ERYTHRONIUM CITRINUM VAR. CITRINUM
"lemon-colored fawn lily" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: March-April
CNPS List: [4] Limited distribution R-E-D: 1-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Lower montane coniferous forest / usually serpentinite
Elevation: 150-1,130 m.
Notes: See E. citrinum in The Jepson Manual.

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ERYTHRONIUM CITRINUM VAR. RODERICKII
"Scott Mountains fawn lily" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: April-June
CNPS List: [1B] R/T/E in CA and elsewhere R-E-D: 3-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Trinity
Quads: Trinity Center (666B), Covington Mill (667A), Mumbo Basin (683A), Tangle Blue Lake (683B), Carrville (683C), Whisky Bill Peak (683D)
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 820-1,340 m.
Notes: Not in The Jepson Manual. See Phytologia 71(2):101-103 (1991) for original description.

FRITILLARIA PURDYI
"Purdy's fritillary" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: March-June
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Glenn, Humboldt, Lake, Mendocino, Napa, Tehama, Trinity, Yolo, Oregon
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest / usually serpentinite
Elevation: 400-2,255 m.
Notes: Endangered in OR.

GALIUM SERPENTICUM SSP. SCOTTICUM
"Scott Mountain bedstraw" Family: Rubiaceae

Life Form: Perennial herb Blooms: May-August
CNPS List: [1B] R/T/E in CA and elsewhere R-E-D: 2-2-3
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity
Quads: Tangle Blue Lake (683B), Billys Peak (684A), Deadman Peak (684B), Mount Eddy (699C), China Mtn. (700A), Gazelle Mtn. (700B), Scott Mountain (700C), Etna (701B), Eaton Peak (701C), Callahan (701D), Yreka (717B)
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 1,000-2,075 m.
Notes: Threatened by logging. See Brittonia 17:326 (1965) for original description, and Flora of California 4(2):33-34 (1979) by L. Dempster for taxonomic treatment.

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GILIA SINISTRA SSP. PINNATISECTA
"pinnate-leaved gilia"
Family: Polemoniaceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Glenn, Humboldt, Lake, Mendocino, Napa, Tehama, Trinity
Habitat: Chaparral, Lower montane coniferous forest / serpentinite or volcanic
Elevation: 300-2,200 m.
Notes: See Madrono 9(7):220 (1948) for original description, and Novon 3:332 (1993) for revised nomenclature.
Blooms: June-August
R-E-D: 1-1-3

HARMONIA DORIS-NILESIAE
"Niles's harmonia"
Family: Asteraceae

Life Form: Annual herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Trinity
Quads: Dubakella Mtn. 15' NW (632B), Dubakella Mtn. 15' SW (632C), Dubakella Mtn. 15' SE (632D), Naufus Creek (633A), Hoosimbim Mtn. (649C), Hayfork (650C), Hyampom Mtn. (651B), Hyampom (651C), Halfway Ridge (651D)
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest / usually serpentinite, openings, rocky
Elevation: 650-1,660 m.
Notes: Threatened by logging, recreation, and road maintenance. A synonym of Madia doris-nilesiae in The Jepson Manual. See Brittonia 37(4):394-396 (1985) for original description, and Novon 9:462-471 (1999) for revised nomenclature.
Blooms: May-July
R-E-D: 3-3-3

HARMONIA STEBBINSII
"Stebbins's harmonia"
Family: Asteraceae

Life Form: Annual herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Tehama, Trinity
Quads: Paskenta (596A), Riley Ridge (596B), Ono 15' SW (630C), Chanchelulla Peak 15' SE (631D), Dubakella Mtn. 15' NE (632A), Dubakella Mtn. 15' SW (632C), Dubakella Mtn. 15' SE (632D)
Habitat: Chaparral, Lower montane coniferous forest / serpentinite
Elevation: 400-1,580 m.
Notes: Known from fewer than twenty occurrences. Possibly threatened by road maintenance. A synonym of Madia stebbinsii in The Jepson Manual. See Brittonia 32(3):323 (1980) for original description, and Novon 9:462-471 (1999) for revised nomenclature.
Blooms: May-June
R-E-D: 3-2-3

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HEMIZONIA CONGESTA SSP. TRACYI
"Tracy's tarplant" Family: Asteraceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Mendocino, Trinity
Habitat: Coastal prairie, Lower montane coniferous forest, North Coast coniferous forest / openings, sometimes serpentinite
Elevation: 120-1,200 m.
Blooms: May-October
R-E-D: 1-1-3

IVESIA PICKERINGII
"Pickering's ivesia" Family: Rosaceae

Life Form: Perennial herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity
Quads: Tangle Blue Lake (683B), Whisky Bill Peak (683D), Weed (699B), China Mtn. (700A), Scott Mountain (700C), Callahan (701D)
Habitat: Lower montane coniferous forest, Meadows / mesic, clay, usually serpentinite seeps
Elevation: 800-1,500 m.
Notes: Known from fewer than twenty occurrences. Threatened by grazing, logging, mining, and road maintenance. Klamath NF has adopted species management guidelines. See Proceedings of the American Academy of Arts and Sciences 6:531 (1865) for original description.
Blooms: June-August
R-E-D: 3-2-3

JUNCUS DUDLEYI
"Dudley's rush" Family: Juncaceae

Life Form: Perennial herb
CNPS List: [2] R/T/E in CA, but more common elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity, Arizona, Oregon, widespread outside of California
Quads: Weaverville (649B), Seiad Valley (736C)
Habitat: Lower montane coniferous forest (mesic)
Elevation: 455-2,000 m.
Notes: Need locality information. Confused with J. tenuis.
Blooms: July-August
R-E-D: 3-1-1

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JUNCUS REGELII
"Regel's rush" Family: Juncaceae

Life Form: Perennial herb (rhizomatous) Blooms: August
CNPS List: [2] R/T/E in CA, but more common elsewhere R-E-D: 3-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity, Oregon, Washington, and other states
Quads: Rush Creek Lakes (667C), Devils Punchbowl (738C), Preston Peak (738D)
Habitat: Meadows, Upper montane coniferous forest / mesic
Elevation: 760-1,900 m.

LEWISIA COTYLEDON VAR. HECKNERI
"Heckner's lewisia" Family: Portulacaceae

Life Form: Perennial herb Blooms: May-July
CNPS List: [1B] R/T/E in CA and elsewhere R-E-D: 2-2-3
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Siskiyou, Trinity
Quads: Junction City (650A), Hayfork Bally (650B), Silva Flat Reservoir (659B), Siligo Peak (667B), Rush Creek Lakes (667C), Mt. Hilton (668A), Thurston Peaks (668B), Dedrick (668D), Ironside Mtn. (669C), Carrville (683C), Caribou Lake (684C), Thompson Peak (685D), Orleans Mtn. (703C), Huckleberry Mtn. (720A), Deadman Point (737B), Happy Camp (737C), Preston Peak (738D)
Habitat: Lower montane coniferous forest (rocky)
Elevation: 225-2,100 m.
Notes: Range overlaps with other varieties; identification difficult.

LEWISIA COTYLEDON VAR. HOWELLII
"Howell's lewisia" Family: Portulacaceae

Life Form: Perennial herb Blooms: April-July
CNPS List: [3] More information is needed. R-E-D: 2-2-2
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Shasta, Siskiyou, Trinity, Oregon
Quads: Trinity Center (666B), Denny (669B), Ironside Mtn. (669C), Yellowjacket Mtn. (681C), Shoeinhorse Mtn. (681D), Whisky Bill Peak (683D), Hoopa (687C), Eaton Peak (701C), Sawyers Bar (702C), Somes Bar (703B), Orleans Mtn. (703C), Orleans (704D), Yreka (717B), Scott Bar (719A), Grider Valley (719B), Boulder Peak (719D), Huckleberry Mtn. (720A), Clear Creek (720B), Ukonom Mtn. (720C), Bear Peak (721A), Chimney Rock (721C), Dillon Mtn. (721D), Badger Mtn. (734C), Buckhorn Bally (735A), Condrey Mtn. (735B), McKinley Mtn. (735D), Dutch Creek (736A), Seiad Valley (736C), Hamburg (736D), Figurehead Mtn. (737A), Deadman Point (737B), Happy Camp (737C), Slater Butte (737D), Preston Peak (738D)
Habitat: Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest / rocky
Elevation: 150-2,010 m.
Notes: Move to List 4? Taxonomic problems. Identification difficult. On watch list in OR. See Proceedings of the American Academy of Arts and Sciences 23:262 (1888) for original description.

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LILIUM PARDALINUM SSP. VOLLMERI
"Vollmer's lily" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: July-August
CNPS List: [4] Limited distribution R-E-D: 1-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Bogs and fens, Meadows (mesic)
Elevation: 30-1,680 m.
Notes: Forms hybrid swarms with ssp. wigginsii in western SIS Co. See Leaflets of Western Botany 5:120-122 (1948) for original description.

LILIUM RUBESCENS
"redwood lily" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: June-August
CNPS List: [4] Limited distribution R-E-D: 1-2-3
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Lake, Mendocino, Napa, Santa Cruz [extirpated], Shasta, Siskiyou, Sonoma, Trinity
Habitat: Broadleafed upland forest, Chaparral, Lower montane coniferous forest, Upper montane coniferous forest / sometimes serpentinite
Elevation: 30-1,715 m.
Notes: Increasingly rare in southern portion of range. Threatened by urbanization, horticultural collection, and grazing. See Proceedings of the American Academy of Arts and Sciences 14:256 (1879) for original description.

LILIUM WASHINGTONIANUM SSP. PURPURASCENS
"purple-flowered Washington lily" Family: Liliaceae

Life Form: Perennial herb (bulbiferous) Blooms: June-August
CNPS List: [4] Limited distribution R-E-D: 1-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Lower montane coniferous forest, Upper montane coniferous forest / often serpentinite
Elevation: 70-2,750 m.
Notes: Possibly threatened by logging and related activities, but often abundant in disturbed areas.

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LIMNANTHES FLOCCOSA SSP. FLOCCOSA
"woolly meadowfoam"
Family: Limnanthaceae

Life Form: Annual herb
Blooms: March-June
CNPS List: [4] Limited distribution
R-E-D: 1-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Lake, Napa, Shasta, Siskiyou, Tehama, Trinity, Oregon
Habitat: Chaparral, Cismontane woodland, Valley and foothill grassland, Vernal pools / vernally mesic
Elevation: 60-1,095 m.
Notes: Threatened by grazing. See Brittonia 25:177-193 (1973) for revised nomenclature.

LOMATIUM ENGELMANNII
"Engelmann's lomatium"
Family: Apiaceae

Life Form: Perennial herb
Blooms: June-August
CNPS List: [4] Limited distribution
R-E-D: 1-1-2
State: [None] No state status
Federal: [None] No federal status
Counties: Mendocino, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Lower montane coniferous forest, Upper montane coniferous forest / serpentinite
Elevation: 870-2,740 m.
Notes: Endangered in OR.

LOMATIUM TRACYI
"Tracy's lomatium"
Family: Apiaceae

Life Form: Perennial herb
Blooms: May-June
CNPS List: [4] Limited distribution
R-E-D: 1-1-2
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Shasta, Siskiyou, Tehama, Trinity, Oregon
Habitat: Lower montane coniferous forest, Upper montane coniferous forest / serpentinite
Elevation: 455-1,950 m.
Notes: Endangered in OR.

LUPINUS CROCEUS VAR. PILOSELLUS
"saffron-flowered lupine"
Family: Fabaceae

Life Form: Perennial herb
Blooms: May-August
CNPS List: [4] Limited distribution
R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Siskiyou, Trinity
Habitat: Lower montane coniferous forest
Elevation: 900-1,700 m.
Notes: See L. croceus in The Jepson Manual.

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MINUARTIA ROSEI
"Peanut sandwort" Family: Caryophyllaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Tehama, Trinity
Habitat: Lower montane coniferous forest (serpentinite)
Elevation: 750-1,525 m.
Blooms: May-July
R-E-D: 1-2-3
Notes: Possibly threatened by logging. See Rhodora 82:499 (1980) for taxonomic treatment.

MONTIA HOWELLII
"Howell's montia" Family: Portulacaceae

Life Form: Annual herb
CNPS List: [2] R/T/E in CA, but more common elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte [?], Humboldt, Trinity, Oregon, Washington, and other states
Quads: Miranda (617A) [extirpated], Briceland (617C) [extirpated], Garberville (617D) [extirpated], Blocksburg (634C), Bridgeville (635A), Redcrest (635B), Myers Flat (635D), Scotia (636A), Owl Creek (653C), McWhinney Creek (654A), Fields Landing (654B), Ferndale (655D), Ironside Mtn. (669C), Salyer (670A) [extirpated], Maple Creek (671D), Eureka (672C), Arcata South (672D)
Habitat: Meadows, North Coast coniferous forest, Vernal pools / vernally mesic
Elevation: 0-595 m.
Blooms: March-May
R-E-D: 3-2-1
Notes: Rediscovered in CA in 1999; now known in CA from approximately ten occurrences. Did plant occur in DNT Co.? Threatened by logging and road construction. Candidate for state listing in OR. Sometimes mistaken for M. fontana or M. dichotoma. See Proceedings of the American Academy of Arts and Sciences 18:191 (1883) for original description.

NAVARRETIA HETERANDRA
"Tehama navarretia" Family: Polemoniaceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Colusa, Lake, Shasta, Tehama, Trinity, Yuba, Oregon
Habitat: Valley and foothill grassland (mesic), Vernal pools
Elevation: 30-945 m.
Blooms: April-June
R-E-D: 1-1-2
Notes: To be expected elsewhere; need information. Endangered in OR. See Madrono 8(6):197 (1946) for original description.

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OENOTHERA WOLFII
"Wolf's evening-primrose"
Family: Onagraceae

Life Form: Perennial herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Blooms: May-October
R-E-D: 3-3-2
Counties: Del Norte, Humboldt, Trinity, Oregon
Quads: Capetown (637A), Cape Mendocino (637B), Carrville (683C), Trinidad (689C), Crannell (689D), Orleans (704D), Orick (706D), Sister Rocks (723B), Requa (723D), Smith River (740B), Crescent City (740C)
Habitat: Coastal bluff scrub, Coastal dunes, Coastal prairie, Lower montane coniferous forest / sandy, usually mesic
Elevation: 3-800 m.
Notes: Known from approximately twenty occurrences. Threatened by road maintenance, foot traffic, non-native plants, and hybridization with non-native Oenothera spp. State-listed as Threatened in OR. See Aliso 2:16 (1949) for original description, and Systematic Botany 4:242-252 (1979) for revised nomenclature.

PENSTEMON FILIFORMIS
"thread-leaved beardtongue"
Family: Scrophulariaceae

Life Form: Perennial herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Blooms: June-July
R-E-D: 2-1-3
Counties: Shasta, Siskiyou, Trinity
Quads: Lamoine (665B), Damnation Peak (666A), Trinity Center (666B), Covington Mill (667A), Siligo Peak (667B), Rush Creek Lakes (667C), Trinity Dam (667D), Dunsmuir (682A), Seven Lakes Basin (682B), Chicken Hawk Hill (682C), Tombstone Mtn. (682D), Tangle Blue Lake (683B), Carrville (683C), Whisky Bill Peak (683D)
Habitat: Cismontane woodland, Lower montane coniferous forest / rocky
Elevation: 450-1,830 m.
Notes: Possibly threatened by logging and recreation. Confused with P. laetus var. sagittatus. See University of California Publications in Botany 16:394 (1932) for original description.

PHACELIA DALESIANA
"Scott Mountain phacelia"
Family: Hydrophyllaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Blooms: May-July
R-E-D: 1-1-3
Counties: Shasta, Siskiyou, Trinity
Habitat: Lower montane coniferous forest, Meadows, Subalpine coniferous forest, Upper montane coniferous forest / serpentinite
Elevation: 1,025-2,105 m.
Notes: Possibly threatened by logging and grazing. See Leaflets of Western Botany 2:51 (1937) for original description.

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PIPERIA CANDIDA
"white-flowered rein orchid" Family: Orchidaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Mendocino, Santa Cruz, Siskiyou, San Mateo, Sonoma, Trinity, Oregon, Washington, and other states
Habitat: Broadleafed upland forest, Lower montane coniferous forest, North Coast coniferous forest / sometimes serpentinite
Elevation: 30-1,310 m.
Notes: Difficult to identify from herbarium material. See Lindleyana 5(4):205-211 (1990) for original description, and The Wild Orchids of California, p. 109-110 (1995) by R. Coleman for species account.
Blooms: May-September
R-E-D: 1-1-1

PLATANTHERA STRICTA
"slender bog-orchid" Family: Orchidaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Modoc, Siskiyou, Trinity, New Mexico, Oregon, Wyoming, widespread outside of California
Habitat: Lower montane coniferous forest, Meadows / mesic
Elevation: 1,000-2,300 m.
Notes: See The Wild Orchids of California, p. 151-153 (1995) by R. Coleman for species account.
Blooms: May-August
R-E-D: 1-2-1

POA RHIZOMATA
"timber blue grass" Family: Poaceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Siskiyou, Trinity, Oregon
Habitat: Lower montane coniferous forest (often serpentinite)
Elevation: 150-1,000 m.
Notes: On review list in OR.
Blooms: April-May
R-E-D: 1-1-1

PYRROCOMA RACEMOSA VAR. PINETORUM
"pine pyrrocoma" Family: Asteraceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Siskiyou, Trinity
Habitat: Lower montane coniferous forest, Meadows, Upper montane coniferous forest
Elevation: 600-1,700 m.
Notes: Threatened by logging. See Madrono 5(5):166 (1940) for original description, and Phytologia 71(1):61 (1991) for revised nomenclature.
Blooms: July-September
R-E-D: 1-2-3

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RHYNCHOSPORA ALBA
"white beaked-rush" Family: Cyperaceae

Life Form: Perennial herb (rhizomatous) Blooms: July-August
CNPS List: [2] R/T/E in CA, but more common elsewhere R-E-D: 2-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte [?], Inyo [?], Lassen, Mendocino, Mariposa [?], Nevada [?], Plumas, Sonoma, Trinity, Idaho, Oregon, Washington, widespread outside of California
Quads: Sebastopol (502A), Mathison Peak (568C), Fort Bragg (569A), Mendocino (569D), Inglenook (585D), Quincy (589B), Crescent Mills (605C), Mt. Harkness (625A), Reading Peak (625B), Dubakella Mtn. 15' SW (632C)
Habitat: Bogs and fens, Meadows, Marshes and Swamps (freshwater)
Elevation: 60-2,040 m.
Notes: Does plant occur in DNT, INY, MPA, or NEV counties? Threatened by grazing, trampling, and hydrological alterations. Endangered in ID, and on review list in OR.

RHYNCHOSPORA CAPITELLATA
"brownish beaked-rush" Family: Cyperaceae

Life Form: Perennial herb Blooms: July-August
CNPS List: [2] R/T/E in CA, but more common elsewhere R-E-D: 2-2-1
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Mariposa, Nevada, Plumas, Shasta, Sonoma [?], Tehama, Trinity, Oregon, Texas, widespread outside of California
Quads: Jawbone Ridge (457D), Sebastopol (502A) [possibly extirpated], Chicago Park (541B), Pike (557B), North Bloomfield (557C), Nevada City (558D), Brush Creek (575A), Kimshew Point (591B), Pulga (591C), Paradise West (592C), Crescent Mills (605C), Trinity Center (666B), Schell Mtn. (666D)
Habitat: Lower montane coniferous forest, Meadows, Marshes and Swamps, Upper montane coniferous forest / mesic
Elevation: 455-2,000 m.
Notes: Need quads for TEH Co. Possibly threatened by grazing and development. See Rhodora 46:115-121 (1944) for taxonomic treatment.

RIBES ROEZLII VAR. AMICTUM
"hoary gooseberry" Family: Grossulariaceae

Life Form: Shrub (deciduous) Blooms: March-April
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Lake, Mendocino, Shasta, Trinity
Habitat: Broadleafed upland forest, Cismontane woodland, Lower montane coniferous forest, Upper montane coniferous forest
Elevation: 120-2,300 m.
Notes: See Pittonia 1:69 (1887) for original description, and Manual of the Flowering Plants of California 2:154 (1936) by W.L. Jepson for revised nomenclature.

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SEDUM PARADISUM
"Canyon Creek stonecrop" Family: Crassulaceae

Life Form: Perennial herb
CNPS List: [1B] R/T/E in CA and elsewhere
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Trinity
Quads: Whiskeytown (648A), Siligo Peak (667B), Mt. Hilton (668A)
Habitat: Broadleafed upland forest, Chaparral, Lower montane coniferous forest, Subalpine coniferous forest / granitic, rocky
Elevation: 300-1,860 m.
Notes: Known from only five occurrences. See Brittonia 30:233-238 (1978) for original description.
Blooms: May-June
R-E-D: 3-1-3

SILENE CAMPANULATA SSP. CAMPANULATA
"Red Mountain catchfly" Family: Caryophyllaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [CE] State listed as Endangered (04/82)
Federal: [None] No federal status
Counties: Colusa, Glenn, Mendocino, Shasta, Tehama, Trinity
Habitat: Chaparral, Lower montane coniferous forest / usually serpentinite, rocky
Elevation: 425-2,085 m.
Notes: Distinction from ssp. glandulosa needs study. See Proceedings of the American Academy of Arts and Sciences 10:341-342 (1875) for original description, and University of Washington Publications in Biology 13:22-23 (1947) for taxonomic treatment.
Blooms: April-July
R-E-D: 1-2-3

STREPTANTHUS DREPANOIDES
"sickle-fruit jewel-flower" Family: Brassicaceae

Life Form: Annual herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Butte, Glenn, Lake, Mendocino, Shasta, Tehama, Trinity
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest / serpentinite
Elevation: 275-1,660 m.
Notes: See Madrono 30(4):230-244 (1983) for original description, and Fremontia 14(2):19 (1986) for species account.
Blooms: April-June
R-E-D: 1-1-3

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TAUSCHIA GLAUCA
"glaucous tauschia" Family: Apiaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Trinity, Oregon
Habitat: Lower montane coniferous forest (gravelly, serpentinite)
Elevation: 80-1,700 m.
Notes: See Contributions from the U.S. National Herbarium 3:321 (1895) for original description.
Blooms: April-June
R-E-D: 1-1-1

THELYPODIUM BRACHYCARPUM
"short-podded thelypodium" Family: Brassicaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Colusa, Lake, Lassen, Napa, Shasta, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Meadows / serpentinite, adobe, alkaline
Elevation: 670-2,560 m.
Notes: Endangered in OR. See Contributions from the Gray Herbarium 204:91-96 (1973) for taxonomic treatment.
Blooms: May-August
R-E-D: 1-2-2

THERMOPSIS GRACILIS VAR. GRACILIS
"slender false lupine" Family: Fabaceae

Life Form: Perennial herb (rhizomatous)
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Shasta, Siskiyou, Trinity, Oregon
Habitat: Chaparral, Cismontane woodland, Lower montane coniferous forest, Meadows, North Coast coniferous forest
Elevation: 100-1,370 m.
Notes: A synonym of T. macrophylla var. venosa in The Jepson Manual. See Erythea 1:109 (1893) for original description, and Annals of the Missouri Botanical Garden 81(3):714-742 (1994) for taxonomic treatment.
Blooms: March-July
R-E-D: 1-1-1

TRILLIUM OVATUM SSP. OETTINGERI
"Salmon Mountains wakerobin" Family: Liliaceae

Life Form: Perennial herb
CNPS List: [4] Limited distribution
State: [None] No state status
Federal: [None] No federal status
Counties: Shasta, Siskiyou, Trinity
Habitat: Lower montane coniferous forest, Riparian scrub, Upper montane coniferous forest / mesic
Elevation: 855-2,000 m.
Notes: Logging and grazing may threaten on private land in eastern part of range. Klamath NF has adopted species management guidelines. See Aliso 8:15-17
Blooms: February-July
R-E-D: 1-2-3

TRILLIUM OVATUM SSP. OETTINGERI (cont.)
(1973) for original description.

VERATRUM INSOLITUM
"Siskiyou false-hellebore" Family: Liliaceae

Life Form: Perennial herb Blooms: June-August
CNPS List: [4] Limited distribution R-E-D: 1-1-1
State: [None] No state status
Federal: [None] No federal status
Counties: Del Norte, Humboldt, Shasta, Siskiyou, Trinity, Oregon, Washington
Habitat: Chaparral, Lower montane coniferous forest / clay
Elevation: 45-1,635 m.
Notes: State-listed as Sensitive in WA.

WYETHIA LONGICAULIS
"Humboldt County wyethia" Family: Asteraceae

Life Form: Perennial herb Blooms: May-July
CNPS List: [4] Limited distribution R-E-D: 1-1-3
State: [None] No state status
Federal: [None] No federal status
Counties: Humboldt, Mendocino, Trinity
Habitat: Broadleafed upland forest, Coastal prairie, Lower montane coniferous forest
Elevation: 750-1,525 m.

APPENDIX M

Plant Species Observed

FIELD VISIT DATES: APRIL 8, MAY 24, AND JULY 16, 2002.

TABLE 1a. PLANT SPECIES OBSERVED AT THE SALT FLAT TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
MONTANE RIPARIAN		
Alnus rhombifolia	White alder	Betulaceae
Amsinckia menziesii var. *intermedia*	Rancher's fireweed	Boraginaceae
Anaphalis margaritacea	Pearly everlasting	Asteraceae
Arabis drummondii	Drummond's rock cress	Brassicaceae
Artemisia douglasiana	Mugwort	Asteraceae
Asclepias fascicularis	Narrow-leaved milkweed	Asclepiadaceae
Asclepias speciosa	Showy milkweed	Asclepiadaceae
Avena fatua	Wild oat	Poaceae
Barbarea orthoceras	American wintercress	Brassicaceae
Brassica nigra	Black mustard	Brassicaceae
Briza minor	Lesser quaking grass	Poaceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Bromus madritensis ssp. *rubens*	Red brome	Poaceae
Bromus tectorum	Cheatgrass	Poaceae
Carex barbarae	Santa Barbara sedge	Cyperaceae
Carex feta	Greensheath sedge	Cyperaceae
Carex nudata	Torrent sedge	Cyperaceae
Centaurea solstitialis	Yellow star thistle	Asteraceae
Chamomilla suaveolens	Pineapple weed	Asteraceae
Cichorium intybus	Chicory	Asteraceae
Cirsium sp.	Thistle	Asteraceae
Clematis ligusticifolia	Virgin's bower	Ranunculaceae
Conium maculatum	Poison hemlock	Apiaceae
Conyza canadensis	Horseweed	Asteraceae
Cryptantha milobakeri	Milo Baker's cryptantha	Boraginaceae
Cyperus eragrostis	Tall nutsedge	Cyperaceae
Darmera peltata	Indian rhubarb	Saxifragaceae
Daucus carota	Queen Anne's lace	Apiaceae
Deschampsia cespitosa	Tufted hairgrass	Poaceae
Dianthus armeria ssp. *armeria*	Grass pink	Caryophyllaceae
Eleocharis acicularis var. *acicularis*	Needle spike rush	Cyperaceae
Eleocharis macrostachya	Pale spike rush	Cyperaceae
Epilobium ciliatum	Willow herb	Onagraceae
Eriophyllum lanatum	Woolly sunflower	Asteraceae
Equisetum laevigatum	Smooth scouring rush	Equisetaceae
Eschscholzia californica	California poppy	Papaveraceae
Fraxinus latifolia	Oregon ash	Oleaceae
Gnaphalium palustre	Lowland cudweed	Asteraceae
Grindelia sp.	Gumplant	Asteraceae

TABLE 1a. PLANT SPECIES OBSERVED AT THE SALT FLAT TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Heterotheca oregona	Oregon golden-aster	Asteraceae
Holcus lanatus	Velvet grass	Poaceae
Hordeum murinum ssp. *leporinum*	Hare wall barley	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae
Juncus effusus	Common rush	Juncaceae
Juncus tenuis	Slender rush	Juncaceae
Juncus xiphioides	Iris-leaved rush	Juncaceae
Lathyrus latifolius	Perennial sweet pea	Fabaceae
Lepidium campestre	English peppergrass	Brassicaceae
Leucanthemum vulgare	Ox-eye daisy	Asteraceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lotus humistratus	Foothill lotus	Fabaceae
Lotus oblongifolius	Bird's-foot trefoil	Fabaceae
Lupinus bicolor	Bi-colored lupine	Fabaceae
Medicago polymorpha	California burclover	Fabaceae
Melica californica	California melic	Poaceae
Mentha pelugium	Pennyroyal	Lamiaceae
Mimulus guttatus	Common monkeyflower	Scrophulariaceae
Mimulus moschatus	Musk monkeyflower	Scrophulariaceae
Petrorhagia dubia	Windmill pink	Caryophyllaceae
Plantago lanceolata	English plantain	Plantaginaceae
Poa bulbosa	Bulbous bluegrass	Poaceae
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	Salicaceae
Potamogeton natans	Floating pondweed	Potamogetonaceae
Pycnanthemum californicum	Sierra mint	Lamiaceae
Ranunculus aquatilus	Water buttercup	Ranunculaceae
Rhus trilobata	Skunkbrush	Anacardiaceae
Ribes divaricatum	Gooseberry	Grossulariaceae
Rosa californica	California rose	Rosaceae
Rubus discolor	Himalayan blackberry	Rosaceae
Rumex acetosella	Sheep sorrel	Polygonaceae
Rumex crispus	Curly dock	Polygonaceae
Salix exigua	Narrow-leaved willow	Salicaceae
Salix lasiolepis	Arroyo willow	Salicaceae
Salix laevigata	Red willow	Salicaceae
Salix lucida	Shining willow	Salicaceae
Saponaria officinalis	Bouncing bet	Caryophyllaceae
Scirpus microcarpus	Small-fruited bulrush	Cyperaceae
Trifolium hirtum	Rose clover	Fabaceae
Triteleia hyacinthina	White brodiaea	Liliaceae
Typha latifolia	Broad-leaved cattail	Typhaceae
Verbascum blattaria	Moth mullein	Scrophulariaceae
Verbascum thapsus	Woolly mullein	Scrophulariaceae
Verbena lasiostachys	Common verbena	Verbenaceae
Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae
MONTANE HARDWOOD - CONIFER		
Amsinckia menziesii var. *intermedia*	Rancher's fireweed	Boraginaceae
Artemisia douglasiana	Mugwort	Asteraceae
Avena fatua	Wild oat	Poaceae

TABLE 1a. PLANT SPECIES OBSERVED AT THE SALT FLAT TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Balsamorhiza deltoidea	Deltoid balsam-root	Asteraceae
Brassica nigra	Black mustard	Brassicaceae
Brickellia californica	California brickellbush	Asteraceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Bromus tectorum	Cheatgrass	Poaceae
Calycadenia truncata	Rosin weed	Asteraceae
Carex barbarae	Santa Barbara sedge	Cyperaceae
Castilleja attenuata	Valley tassels	Scrophulariaceae
Ceanothus integerrimus	Deer brush	Rhamnaceae
Centaurea solstitialis	Yellow star thistle	Asteraceae
Cichorium intybus	Chicory	Asteraceae
Convolvulus occidentalis ssp. *occidentalis*	Western morn ing glory	Convolvulaceae
Delphinium sp.	Larkspur	Ranunculaceae
Dichelostemma multiflorum	Wild hyacinth	Liliaceae
Eriodictyon californicum	Yerba Santa	Hydrophyllaceae
Eriogonum nudum	Naked buckwheat	Polygonaceae
Erodium botrys	Filaree	Geraniaceae
Fraxinus latifolia	Oregon ash	Oleaceae
Galium bolanderi	Bolander's bedstraw	Rubiaceae
Holcus lanatus	Velvet grass	Poaceae
Hordeum murinum ssp. *leporinum*	Hare wall barley	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae
Iris tenuissima	Iris	Iridaceae
Lathyrus latifolius	Perennial sweet pea	Fabaceae
Lathyrus sulphureus	Sulfur pea	Fabaceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lithophragma sp.	Woodland star	Saxifragaceae
Lolium multiflorum	Annual ryegrass	Poaceae
Lotus purshianus var. *purshianus*	Spanish lotus	Fabaceae
Lupinus albifrons	Silver bush lupine	Fabaceae
Lupinus bicolor	Bi-colored lupine	Fabaceae
Medicago polymorpha	California burclover	Fabaceae
Melica californica	California melic	Poaceae
Micropus californica	Slender cottonweed	Asteraceae
Osmorhiza occidentalis	Sierran sweet-cicely	Apiaceae
Petrorhagia dubia	Grass pink	Caryophyllaceae
Phacelia hastata	Silverleaf phacelia	Hydrophyllaceae
Pinus ponderosa	Ponderosa pine	Pinaceae
Plagiobothrys sp.	Popcornflower	Boraginaceae
Plantago lanceolata	English plantain	Plantaginaceae
Poa bulbosa	Bulbous bluegrass	Poaceae
Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Pinaceae
Quercus kelloggii	Black oak	Fagaceae
Rhus trilobata	Skunkbrush	Anacardiaceae
Rosa californica	California rose	Rosaceae
Rubus discolor	Himalayan blackberry	Rosaceae
Symphoricarpos albus var. *laevigatus*	Snowberry	Caprifoliaceae
Taeniatherum caput-medusae	Medusa head	Poaceae

TABLE 1a. PLANT SPECIES OBSERVED AT THE SALT FLAT TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Thysanoacarpus curvipes	Fringepod	Brassicaceae
Torilis arvensis	Hedge-parsley	Apiaceae
Toxicodendron diversilobum	Poison oak	Anacardiaceae
Tragopogon dubius	Western salsify	Asteraceae
Trientalis latifolia	Starflower	Primulaceae
Trifolium arvense	Rabbitfoot clover	Fabaceae
Trifolium hirtum	Rose clover	Fabaceae

FIELD VISIT DATES: APRIL 9, MAY 25, and JUNE 28, 2002.

TABLE 1b. PLANT SPECIES OBSERVED AT THE BUCKTAIL TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
MONTANE RIPARIAN		
Alnus rhombifolia	White alder	Betulaceae
Anagallis arvensis	Scarlet pimpernel	Primulaceae
Artemisia douglasiana	Mugwort	Asteraceae
Bromus tectorum	Cheatgrass	Poaceae
Carex nudata	Torrent sedge	Cyperaceae
Centaurea solstitialis	Yellow star thistle	Asteraceae
Chamomilla suaveolens	Pineapple weed	Asteraceae
Cichorium intybus	Chicory	Asteraceae
Cirsium sp.	Thistle	Asteraceae
Cyperus eragrostis	Tall nutsedge	Cyperaceae
Dactylis glomerata	Orchard grass	Poaceae
Darmera peltata	Indian rhubarb	Saxifragaceae
Deschampsia cespitosa	Tufted hairgrass	Poaceae
Echinochloa crus-galli	Barnyard grass	Poaceae
Epilobium ciliatum	Willow herb	Onagraceae
Equisetum laevigatum	Smooth scouring rush	Equisetaceae
Fraxinus latifolia	Oregon ash	Oleaceae
Heterotheca oregona	Oregon golden-aster	Asteraceae
Holcus lanatus	Velvet grass	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Juncus ensifolius	Sword-leaved rush	Juncaceae
Lemna sp.	Duckweed	Lemnaceae
Lepidium sp.	Pepperwort	Brassicaceae
Leucanthemum vulgare	Ox-eye daisy	Asteraceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lotus oblongifolius	Bird's-foot trefoil	Fabaceae
Mentha pelugium	Pennyroyal	Lamiaceae
Mimulus guttatus	Common monkeyflower	Scrophulariaceae
Panicum acuminatum var. *acuminatum*	Panicgrass	Poaceae
Pinus sabiniana	Gray pine	Pinaceae
Plantago lanceolata	English plantain	Plantaginaceae
Polygonum lapathifolium	Willow weed	Polygonaceae
Rhus trilobata	Skunkbrush	Anacardiaceae
Rosa californica	California rose	Rosaceae
Rubus discolor	Himalayan blackberry	Rosaceae
Rumex acetosella	Sheep sorrel	Polygonaceae
Rumex salicifolius	Willow dock	Polygonaceae
Salix exigua	Narrow-leaved willow	Salicaceae
Salix lasiolepis	Arroyo willow	Salicaceae
Trifolium arvense	Rabbitfoot clover	Fabaceae

TABLE 1b. PLANT SPECIES OBSERVED AT THE BUCKTAIL TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Typha latifolia	Broad-leaved cattail	Typhaceae
Verbascum thapsus	Woolly mullein	Scrophulariaceae
Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae
Vitis californica	California wild grape	Vitaceae
MONTANE HARDWOOD - CONIFER		
Achnatherum occidentalis	Needle grass	Poaceae
Aira caryophyllea	Silver European hairgrass	Poaceae
Amelanchier alnifolia	Service-berry	Rosaceae
Anaphalis margaritacea	Pearly everlasting	Asteraceae
Arctostaphylos manzanita	Common manzanita	Ericaceae
Arctostaphylos viscida ssp. *viscida*	Whiteleaf manzanita	Ericaceae
Artemisia douglasiana	Mugwort	Asteraceae
Avena fatua	Wild oat	Poaceae
Berberis aquifolium var. *aquifolium*	Oregon grape	Berberidaceae
Brickellia californica	California brickellbush	Asteraceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Bromus madritensis ssp. *rubens*	Red brome	Poaceae
Bromus tectorum	Cheatgrass	Poaceae
Calocedrus decurrens	Incense cedar	Cupressaceae
Calycadenia truncata	Rosin weed	Asteraceae
Ceanothus cuneatus	Buck brush	Rhamnaceae
Centaurea solstitialis	Yellow star thistle	Asteraceae
Cerastium glomeratum	Mouse-ear chickweed	Caryophyllaceae
Cercocarpus betuloides var. *betuloides*	Birch-leaf Mountain-mahogany	Rosaceae
Cirsium occidentalis	Snowy thistle	Asteraceae
Clarkia rhomboidea	Diamond clarkia	Onagraceae
Claytonia perfoliata	Miner's lettuce	Portulacaceae
Collomia heterophylla	Variable-leaved collomia	Polemoniaceae
Conium maculatum	Poison hemlock	Apiaceae
Crepis capillaris	Smooth hawk's-beard	Asteraceae
Cryptantha milobakeri	Milo Baker's cryptantha	Boraginaceae
Cytisus scoparius	Scotch broom	Fabaceae
Dactylis glomerata	Orchard grass	Poaceae
Daucus pusillus	Rattlesnake-weed	Apiaceae
Dichelostemma capitatum	Blue dicks	Liliaceae
Elymus glaucus	Blue wildrye	Poaceae
Eriogonum nudum	Naked buckwheat	Polygonaceae
Eriogonum vimineum	Wicker buckwheat	Polygonaceae
Eriophyllum lanatum	Woolly sunflower	Asteraceae
Erodium botrys	Filaree	Geraniaceae
Eschscholzia californica	California poppy	Papaveraceae
Galium bolanderi	Bolander's bedstraw	Rubiaceae
Garrya fremontii	Fremont's silk tassel	Garryaceae
Grindelia sp.	Gumplant	Asteraceae
Heteromeles arbutifolia	Toyon	Rosaceae
Holcus lanatus	Velvet grass	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae

TABLE 1b. PLANT SPECIES OBSERVED AT THE BUCKTAIL TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Lactuca serriola	Prickly lettuce	Asteraceae
Lathyrus latifolius	Perennial sweet pea	Fabaceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lomatium utriculatum	Bladder lomatium	Apiaceae
Lotus humistratus	Foothill lotus	Fabaceae
Lotus purshianus var. *purshianus*	Spanish lotus	Fabaceae
Lupinus bicolor	Bi-colored lupine	Fabaceae
Lupinus latifolius var. *latifolius*	Broad-leaved lupine	Fabaceae
Medicago polymorpha	California burclover	Fabaceae
Micropus californica	Slender cottonweed	Asteraceae
Nemophila heterophylla	Variable-leaved nemophila	Hydrophyllaceae
Petrorhagia dubia	Windmill pink	Caryophyllaceae
Phacelia hastata	Silverleaf phacelia	Hydrophyllaceae
Pinus ponderosa	Ponderosa pine	Pinaceae
Plagiobothrys sp.	Popcornflower	Boraginaceae
Plantago lanceolata	English plantain	Plantaginaceae
Poa bulbosa	Bulbous bluegrass	Poaceae
Poa pratensis	Bluegrass	Poaceae
Polystichum imbricans	Narrow-leaved sword fern	Dryopteridaceae
Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Pinaceae
Pteridium aquilinum var. *pubescens*	Western bracken fern	Dennstaedtiaceae
Quercus chrysolepis	Canyon live oak	Fagaceae
Quercus durata	Leather oak	Fagaceae
Quercus kelloggii	Black oak	Fagaceae
Quercus wislizenii	Interior live oak	Fagaceae
Rhus trilobata	Skunkbrush	Anacardiaceae
Ribes roezlii	Sierra gooseberry	Grossulariaceae
Rosa californica	California rose	Rosaceae
Rumex acetosella	Sheep sorrel	Polygonaceae
Symphoricarpos albus var. *laevigatus*	Snowberry	Caprifoliaceae
Taeniatherum caput-medusae	Medusa head	Poaceae
Thysanoacarpus curvipes	Fringepod	Brassicaceae
Torilis arvensis	Hedge-parsley	Apiaceae
Toxicodendron diversilobum	Poison oak	Anacardiaceae
Tragopogon dubius	Western salsify	Asteraceae
Trifolium arvense	Rabbitfoot clover	Fabaceae
Trifolium hirtum	Rose clover	Fabaceae
Verbascum thapsus	Woolly mullein	Scrophulariaceae
Vitis californica	California wild grape	Vitaceae

FIELD VISIT DATES: APRIL 9, MAY 25, and JULY 1, 2002.

TABLE 1c. PLANT SPECIES OBSERVED AT THE POKER BAR TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
MONTANE RIPARIAN		
Acer macrophyllum	Bigleaf maple	Aceraceae
Achillea millefolium	Yarrow	Asteraceae
Alnus rhombifolia	White alder	Betulaceae
Artemisia douglasiana	Mugwort	Asteraceae
Asclepias fascicularis	Narrow-leaved milkweed	Asclepiadaceae
Asclepias speciosa	Showy milkweed	Asclepiadaceae
Avena fatua	Wild oat	Poaceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Bromus madritensis ssp. *rubens*	Red brome	Poaceae
Bromus tectorum	Cheatgrass	Poaceae
Calandrinia ciliata	Red maids	Portulacaceae
Carex nudata	Torrent sedge	Cyperaceae
Centaurea solstitialis	Yellow star thistle	Asteraceae
Chamomilla suaveolens	Pineapple weed	Asteraceae
Cichorium intybus	Chicory	Asteraceae
Cirsium occidentalis	Snowy thistle	Asteraceae
Conium maculatum	Poison hemlock	Apiaceae
Cryptantha milobakeri	Milo Baker's cryptantha	Boraginaceae
Cyperus eragrostis	Tall nutsedge	Cyperaceae
Daucus carota	Queen Anne's lace	Apiaceae
Deschampsia cespitosa	Tufted hairgrass	Poaceae
Dianthus armeria ssp. *armeria*	Grass pink	Caryophyllaceae
Dicentra formosa	Bleeding heart	Papaveraceae
Epilobium ciliatum	Willow herb	Onagraceae
Equisetum laevigatum	Smooth scouring rush	Equisetaceae
Eriophyllum lanatum	Woolly sunflower	Asteraceae
Erodium botrys	Filaree	Geraniaceae
Eschscholzia californica	California poppy	Papaveraceae
Festuca rubra	Red fescue	Poaceae
Fraxinus latifolia	Oregon ash	Oleaceae
Galium aparine	Goose grass	Rubiaceae
Holcus lanatus	Velvet grass	Poaceae
Hordeum brachyantherum	Meadow barley	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae
Juncus effusus	Common rush	Juncaceae
Lepidium sp.	Pepperwort	Brassicaceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lotus humistratus	Foothill lotus	Fabaceae
Lupinus bicolor	Bi-colored lupine	Fabaceae
Lupinus latifolius var. *latifolius*	Broad-leaved lupine	Fabaceae
Medicago polymorpha	California burclover	Fabaceae
Mimulus guttatus	Common monkeyflower	Scrophulariaceae
Narcissus pseudo-narcissus	Daffodil	Liliaceae
Nemophila heterophylla	Variable-leaved nemophila	Hydrophyllaceae

TABLE 1c. PLANT SPECIES OBSERVED AT THE POKER BAR TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Petrorhagia dubia	Windmill pink	Caryophyllaceae
Pinus ponderosa	Ponderosa pine	Pinaceae
Plantago lanceolata	English plantain	Plantaginaceae
Poa annua	Annual bluegrass	Poaceae
Poa bulbosa	Bulbous bluegrass	Poaceae
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	Salicaceae
Rosa californica	California rose	Rosaceae
Rubus discolor	Himalayan blackberry	Rosaceae
Rumex acetosella	Sheep sorrel	Polygonaceae
Salix exigua	Narrow-leaved willow	Salicaceae
Salix lasiolepis	Arroyo willow	Salicaceae
Salix laevigata	Red willow	Salicaceae
Scirpus microcarpus	Small-fruited bulrush	Cyperaceae
Trifolium hirtum	Rose clover	Fabaceae
Verbascum thapsus	Woolly mullein	Scrophulariaceae
Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae
Vicia sativa	Common vetch	Fabaceae
Vitis californica	California wild grape	Vitaceae
MONTANE HARDWOOD - CONIFER		
Aira caryophyllea	Silver European hairgrass	Poaceae
Amelanchier alnifolia	Service-berry	Rosaceae
Amsinckia menziesii var. *intermedia*	Rancher's fireweed	Boraginaceae
Arbutus menziesii	Pacific madrone	Ericaceae
Arctostaphylos viscida	Whiteleaf manzanita	Ericaceae
Avena fatua	Wild oat	Poaceae
Brodiaea sp.	Brodiaea	Liliaceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Ceanothus integerrimus	Deer brush	Rhamnaceae
Cerastium glomeratum	Mouse-ear chickweed	Caryophyllaceae
Cercocarpus betuloides var. *betuloides*	Birch-leaf Mountain-mahogany	Rosaceae
Cornus sericea	American dogwood	Cornaceae
Elymus glaucus	Blue wildrye	Poaceae
Eriogonum nudum	Naked buckwheat	Polygonaceae
Hieracium albiflorum	White-flowered hawkweed	Asteraceae
Linanthus ciliatus	Whisker brush	Polemoniaceae
Pinus ponderosa	Ponderosa pine	Pinaceae
Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Pinaceae
Pteridium aquilinum var. *pubescens*	Western bracken fern	Dennstaedtiaceae
Quercus garryana var. *garryana*	Oregon white oak	Fagaceae
Quercus kelloggii	Black oak	Fagaceae
Ranunculus occidentalis	Western buttercup	Ranunculaceae
Tonella tenella	Small-flowered tonella	Scrophulariaceae
Torilis arvensis	Hedge-parsley	Apiaceae
Toxicodendron diversilobum	Poison oak	Anacardiaceae
Tragopogon dubius	Western salsify	Asteraceae

FIELD VISIT DATES: APRIL 8, MAY 25, and JULY 18, 2002.

TABLE 1d. PLANT SPECIES OBSERVED AT THE BIGGERS ROAD TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
MONTANE RIPARIAN		
Alnus rhombifolia	White alder	Betulaceae
Artemisia douglasiana	Mugwort	Asteraceae
Carex deweyana ssp. *leptopoda*	Short-scaled sedge	Cyperaceae
Carex nudata	Torrent sedge	Cyperaceae
Chamomilla suaveolens	Pineapple weed	Asteraceae
Cichorium intybus	Chicory	Asteraceae
Clematis ligusticifolia	Virgin's bower	Ranunculaceae
Cornus nuttallii	Mountain dogwood	Cornaceae
Dactylis glomerata	Barnyard grass	Poaceae
Deschampsia cespitosa	Tufted hairgrass	Poaceae
Equisetum laevigatum	Smooth scouring rush	Equisetaceae
Fraxinus latifolia	Oregon ash	Oleaceae
Holcus lanatus	Velvet grass	Poaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae
Juncus effusus	Common rush	Juncaceae
Juncus ensifolius	Sword-leaved rush	Juncaceae
Lathyrus latifolius	Perennial sweet pea	Fabaceae
Medicago polymorpha	California burclover	Fabaceae
Plantago lanceolata	English plantain	Plantaginaceae
Poa bulbosa	Bulbous bluegrass	Poaceae
Populus balsamifera ssp. *trichocarpa*	Black cottonwood	Salicaceae
Potamogeton natans	Floating pondweed	Potamogetonaceae
Ranunculus aquatilis	Water buttercup	Ranunculaceae
Rhus trilobata	Skunkbrush	Anacardiaceae
Rosa californica	California rose	Rosaceae
Rubus discolor	Himalayan blackberry	Rosaceae
Rumex crispus	Curly dock	Polygonaceae
Salix exigua	Narrow-leaved willow	Salicaceae
Salix laevigata	Red willow	Salicaceae
Salix lasiolepis	Arroyo willow	Salicaceae
Spiraea douglasii	Douglas' spiraea	Rosaceae
Verbascum thapsus	Woolly mullein	Scrophulariaceae
Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae
Vitis californica	California wild grape	Vitaceae
KLAMATH MIXED CONIFER		
Achnatherum occidentalis	Needle grass	Poaceae
Aira caryophyllea	Silver European hairgrass	Poaceae
Arbutus menziesii	Pacific madrone	Ericaceae
Arctostaphylos viscida	Whiteleaf manzanita	Ericaceae
Artemisia douglasiana	Mugwort	Asteraceae
Asarum hartwegii	Wild ginger	Aristolochiaceae
Asclepias speciosa	Showy milkweed	Asclepiadaceae
Bromus diandrus	Ripgut grass	Poaceae
Bromus hordeaceus	Softchess	Poaceae
Calycadenia truncata	Rosin weed	Asteraceae
Calystegia occidentalis ssp. *occidentalis*	Western morning glory	Convolvulaceae

TABLE 1d. PLANT SPECIES OBSERVED AT THE BIGGERS ROAD TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Ceanothus integerrimus	Deer brush	Rhamnaceae
Centaurium venustum	Canchalagua	Gentianaceae
Chimaphila menziesii	Prince's pine	Ericaceae
Cichorium intybus	Chicory	Asteraceae
Clarkia rhomboidea	Diamond clarkia	Onagraceae
Claytonia rubra ssp. *rubra*	Red-stemmed Miner's lettuce	Portulacaceae
Cynosurus echinatus	Hedgehog dogtail	Poaceae
Daucus carota	Queen Anne's lace	Apiaceae
Dianthus armeria ssp. *armeria*	Grass pink	Caryophyllaceae
Dicentra formosa	Bleeding heart	Papaveraceae
Elymus glaucus	Blue wildrye	Poaceae
Festuca rubra	Red fescue	Poaceae
Galium bolanderi	Bolander's bedstraw	Rubiaceae
Hieracium albiflorum	White-flowered hawkweed	Asteraceae
Holcus lanatus	Velvet grass	Poaceae
Hordeum murinum ssp. *leporinum*	Hare wall barley	Poaceae
Hypericum perforatum	Klamathweed	Hypericaceae
Hypochaeris radicata	Rough cat's ears	Asteraceae
Lepidium sp.	Pepperwort	Brassicaceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lolium multiflorum	Annual ryegrass	Poaceae
Lomatium utriculatum	Bladder lomatium	Apiaceae
Lupinus latifolius var. *latifolius*	Broad-leaved lupine	Fabaceae
Melica californica	California melic	Poaceae
Narcissus pseudo-narcissus	Daffodil	Liliaceae
Nemophila heterophylla	Variable-leaved nemophila	Hydrophyllaceae
Osmorhiza occidentalis	Sierran sweet-cicely	Apiaceae
Petrorhagia dubia	Windmill pink	Caryophyllaceae
Pinus ponderosa	Ponderosa pine	Pinaceae
Poa pratensis	Bluegrass	Poaceae
Polypogon maritimus	Mediterranean beard grass	Poaceae
Polystichum imbricans	Narrow-leaved sword fern	Dryopteridaceae
Pseudotsuga menziesii var. *menziesii*	Douglas-fir	Pinaceae
Pteridium aquilinum var. *pubescens*	Western bracken fern	Dennstaedtiaceae
Quercus chrysolepis	Canyon live oak	Fagaceae
Quercus wislizenii	Interior live oak	Fagaceae
Ribes roezlii	Sierra gooseberry	Grossulariaceae
Saponaria officinalis	Bouncing bet	Caryophyllaceae
Silene californica	Indian pink	Caryophyllaceae
Symphoricarpos albus var. *laevigatus*	Snowberry	Caprifoliaceae
Tonella tenella	Small-flowered tonella	Scrophulariaceae
Torilis arvensis	Hedge-parsley	Apiaceae
Toxicodendron diversilobum	Poison oak	Anacardiaceae
Trientalis latifolia	Starflower	Primulaceae
Trifolium hirtum	Rose clover	Fabaceae
Viola lobata	Pine violet	Violaceae
Vitis californica	California wild grape	Vitaceae
MONTANE HARDWOOD - CONIFER		
Avena fatua	Wild oat	Poaceae
Bromus diandrus	Ripgut grass	Poaceae

TABLE 1d. PLANT SPECIES OBSERVED AT THE BIGGERS ROAD TRINITY BRIDGE SITE		
SCIENTIFIC NAME	**COMMON NAME**	**FAMILY NAME**
Castilleja applegatei	Wavy-leaved Indian paintbrush	Scrophulariaceae
Cercis occidentalis	Redbud	Fabaceae
Dactylis glomerata	Barnyard grass	Poaceae
Dichelostemma capitatum	Blue dicks	Liliaceae
Eriodictyon californicum	Yerba Santa	Hydrophyllaceae
Eriogonum nudum	Naked buckwheat	Polygonaceae
Erodium cicutarium	Filaree	Geraniaceae
Keckiella lemmonii	Lemmon's keckiella	Scrophulariaceae
Lathyrus latifolius	Perennial sweet pea	Fabaceae
Linanthus ciliatus	Whisker brush	Polemoniaceae
Linaria genistifolia ssp. *dalmatica*	Dalmatian toadflax	Scrophulariaceae
Lomatium utriculatum	Bladder lo matium	Apiaceae
Lupinus latifolius var. *latifolius*	Broad-leaved lupine	Fabaceae
Monardella villosa	Coyote-mint	Lamiaceae
Nemophila heterophylla	Variable-leaved nemophila	Hydrophyllaceae
Penstemon anguineus	Siskiyou beardtongue	Scrophulariaceae
Pentagramma triangularis	Goldback fern	Pteridaceae
Petrorhagia dubia	Windmill pink	Caryophyllaceae
Phacelia sp.	Phacelia	Hydrophyllaceae
Pinus sabiniana	Gray pine	Pinaceae
Polypogon maritimus	Mediterranean beard grass	Poaceae
Thysanoacarpus curvipes	Fringepod	Brassicaceae
Torilis arvensis	Hedge-parsley	Apiaceae
Toxicodendron diversilobum	Poison oak	Anacardiaceae
Trifolium hirtum	Rose clover	Fabaceae
Vicia sativa	Common vetch	Fabaceae

APPENDIX N

Trinity River Bridges
Northern Spotted Owl Survey Results

July 22, 2002

Mr. Ray Bosch
U.S. Fish and Wildlife – Arcata Office
1655 Heindon Road
Arcata, CA 95521

RE: 2002 Northern Spotted Owl Survey Results for the Trinity River Bridge Replacement Project (NSR #10006).

Dear Mr. Bosch:

This letter provides formal notification of a negative finding from the northern spotted owl (*Strix occidentalis courina*; NOSPO) survey conducted within suitable habitat surrounding the Trinity River Bridge Replacement Project sites. As I have discussed with you on the phone and in an email dated May 24, 2002 (copy attached), the Bureau of Reclamation, the Bureau of Land Management, and Trinity County are proposing to replace 4 bridges over the Trinity River. Work will be conducted within the areas immediately surrounding each of the bridges, with an additional work area surrounding a borrow site at the mouth of Rush Creek. Study areas for each bridge site and the borrow site have been defined, but the precise construction methodology that will be used is still under development. North State Resources (NSR) has been awarded the contract to write the EA/EIR documents for the project, and as part of the environmental review we initiated this 6-visit protocol-level survey for NOSPO in suitable habitat occurring within ¼ mile of any related construction area. The purpose of this survey was to: 1. assess habitat suitability for NOSPO within the ¼ mile radius study areas and 2. to identify whether the suitable habitat was currently occupied.

Habitat suitability is defined in the Federal Register (January 15, 1992) as habitat suitable for nesting, roosting, foraging and dispersing. In general, suitable nesting, roosting and foraging habitat is considered to contain mature conifer forests with large snags and trees, and large horizontal limbs for perching. Using this definition, none of the conifer habitat found in the vicinity of the bridge replacement project sites are suitable for nesting, roosting or foraging. However, it is possible that a NOSPO would utilize the young mixed conifer forests for dispersal. Suitable NOSPO dispersal habitat occurs on the southwest side of the Treadwell bridge (T. 32N, R. 9W, Sec. 32), the west side of the Poker Bar bridge (T. 32N, R. 9W, Sec. 33), a small area on the west side of the Salt Flat bridge (T. 32N, R. 9W., Sec. 13), and a small conifer stand on the south side of the Rush Creek borrow site (T. 32N, R 9W., Sec. 13).

The survey was done according to the *Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation Areas* (March 12, 1991, Revised February 1993). Two NOSPO calling stations were established around each bridge site listed above, and due to limited suitable habitat, only one calling station was established at the Rush Creek Borrow Site (Figures 1 and 2). Each calling station was visited 6 times on the following dates: May 15, May 23, June 6, June 17, June 25, and July 10, 2002.

Although no formal consultation is currently underway for this project, you suggested NSR conduct this 6-visit survey to get a good understanding of the current conditions regarding NOSPO in the project area. Once final construction plans have been made, we will be able to discuss the adequacy of the ¼ mile study limit and the need for additional surveys.

If you have any questions or comments, please call me at (530) 926-3595.

Sincerely,
North State Resources, Inc.

Julian Colescott
Wildlife Biologist/Environmental Analyst

c: James DeStaso
Ed Solbos
Tom Stokley
Brandt Gutermuth

Enclosures:

- May 24, 2002 email establishing a record of conversation for the Trinity River Bridge Replacement Project.
- Field Map of Call Point Locations
- Datasheets.
- CNDDB Map of Special-Status Animals

APPENDIX O

Programmatic Agency Agreement for Section 106 Trinity River Mainstem Fishery Restoration

PROGRAMMATIC AGREEMENT
AMONG THE U. S. BUREAU OF RECLAMATION,
U. S. FISH AND WILDLIFE SERVICE, U.S. BUREAU OF LAND MANAGEMENT,
HOOPA VALLEY TRIBE,
CALIFORNIA STATE HISTORIC PRESERVATION OFFICER, AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING IMPLEMENTATION OF
THE TRINITY RIVER MAINSTEM FISHERY RESTORATION

WHEREAS, the U.S. Bureau of Reclamation (Reclamation), U. S. Fish and Wildlife Service (Service), U.S. Bureau of Land Management (Bureau), and the Hoopa Valley Tribe (Tribe) have determined that implementing the actions (Undertaking) outlined in the Trinity River Mainstem Fishery Restoration Environmental Impact Statement/Report (Trinity EIS/R) for purposes of protecting, restoring, and enhancing fish and wildlife, may affect historic properties; and

WHEREAS, Reclamation, the Service, the Bureau (agencies) and the Tribe have elected to comply with Section 106 of the National Historic Preservation Act(NHPA) for the Undertaking through execution and implementation of a Programmatic Agreement (Agreement) pursuant to 36 CFR Section 800.14, because not all Trinity EIS/R implementing actions have as yet been identified and because neither the scope and magnitude of the Undertaking's effects to historic properties nor the historic properties themselves have been identified at the time of execution of this Agreement; and

WHEREAS, the agencies, pursuant to 36 CFR 800.8(a)(1) and 800.8(a)(3), will coordinate compliance with the requirements of the National Environmental Policy Act (NEPA) for actions covered by this Agreement with the requirements of Subpart B of 36 CFR Part 800, and as part of this process of coordination, may use the NEPA process and associated documentation to supplement compliance with Subpart B; and

WHEREAS, pursuant to 36 CFR Section 800.2(c)(2)(ii), the Tribe=s representative shall be included in the term Tribal Historic Preservation Officer (THPO) for undertakings occurring on or affecting historic properties on its tribal lands and affecting properties of religious and cultural significance to the Tribe located on or off-tribal lands, and for any such undertakings, the primary responsible Federal agency (RFA) shall also consult with the THPO, in addition to the SHPO, where consultation is required under this Agreement; and

WHEREAS, the agencies have consulted with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to Section 800.14 (b) of the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470f) to resolve any adverse effects of the Undertaking on historic properties; and

WHEREAS, throughout the implementation of this Agreement, Reclamation and the Service the shall consult with Indian tribes, organizations and individuals that may attach religious and cultural significance to, or that may have concerns about the Undertaking's effects on historic properties,

NOW, THEREFORE, Reclamation, the Service, the Bureau, the Tribe, the SHPO, and the Council agree that the following stipulations shall be implemented in order to take into account the effects of the Undertaking on historic properties, and that these stipulations shall govern the Undertaking and all of its parts until this Agreement expires or is terminated.

STIPULATIONS

Reclamation and the Service shall ensure that the following measures are carried out:

I. ASSIGNMENT OF RESPONSIBILITY

Either Reclamation or the Service will be responsible for ensuring that the terms of this Agreement are carried out for all individual actions authorized or funded by the Department of the Interior comprising the Undertaking, irrespective of where or by whom the action will be carried out. Prior to preparation of environmental documentation for each action covered by this Agreement, Reclamation and the Service will consult to determine which agency will serve as primary responsible federal agency (RFA) for such action. The selected RFA will be responsible for implementing the terms of this Agreement with respect to the action proposed. The Service shall comply with the terms of this Agreement for the Undertaking and all individual actions therein, in lieu of the Programmatic Agreement among the Service, Council, and the SHPO executed on May 7, 1997.

II. AREAS OF POTENTIAL EFFECTS (APEs)

a. For purposes of this Agreement, the APE for the Undertaking in its entirety shall consist of the area within the 500 year floodplain of the Trinity River from the Trinity Reservoir downstream to the Hoopa Valley Indian Reservation, the area within the drawdown zones of the Trinity Reservoir, and ancillary areas within or outside of the 500 year floodplain that will be affected by implementing actions and associated facilities, such as material borrow sites, access roads, sediment pond construction and maintenance.

b. At the earliest stage of planning for any action comprising the Undertaking, the RFA will determine and document an area of potential effects (APE) in strict accordance with the definition set forth in 36 CFR 800.16(d). The APE for an action covered by this Agreement will be defined either before or concurrently with the earliest stages of NEPA compliance for the action.

III. REVIEW OF TRINITY EIS/R IMPLEMENTING ACTIONS

a. Coordination with NEPA

The RFA shall ensure that compliance with the terms of this Agreement is coordinated with NEPA compliance. When a specific Trinity EIS/R implementing action is identified, the RFA=s archaeologist will establish an APE pursuant to Stipulation III.B., below, and ensure that an appropriate level of effort is conducted to identify historic properties within that APE. Specific steps taken to comply with this Agreement will be included in an Environmental Assessment (EA) or categorical exclusion checklist (CEC) prepared for a Trinity EIS/R implementing action. An EA will, to the extent possible,

describe efforts to identify historic properties and, if applicable, identify and discuss measures that will avoid, minimize or mitigate potential adverse effects to historic properties. CECs will be prepared for minor actions where no historic properties have been identified within the APE. All CECs will be reviewed by Reclamation's Regional Archeologist, or by the Bureau=s Redding or Arcata Field Archeologist, or by the Service=s Regional Archeologist, to ensure that no historic properties will be affected by a proposed action. The final EIS or subsequent NEPA documentation for a Trinity EIS/R implementing action shall include, to the extent possible, appropriate documentation evidencing compliance with the terms of this Agreement. The RFA will ensure that the Finding of No Significant Impact or the Record of Decision for any action includes a plan for the treatment of historic properties adversely affected by such action.

b. IDENTIFYING HISTORIC PROPERTIES

36 CFR 800.4(b)(1) is the general standard which the RFA will use to determine the level of effort needed to identify historic properties within the APE of each Trinity EIS/R implementing action covered by this Agreement. In addition, as part of identification, the RFA will place special emphasis on the consultation prescribed by 36 CFR 800.4(a)(4) and by 36 CFR 800.4(b). The general standard set forth in 36 CFR 800.4(b)(1) will be supplemented by the following:

(1) The results of the cultural resources overview prepared for the Trinity River Mainstem Fishery Restoration EIS/R;

(2)Applicable inventory standards identified in Reclamation Instructions (376.3B) or in the Service's Administrative Manual and the Service's Cultural Resource Management Handbook (1985). Cultural resources and historic properties identified during inventory will be recorded as follows:

(a) A new or updated California Department of Parks and Recreation Form DPR 523 (series 1/95) will be completed in accordance with the Instructions for Recording Historical Resources (Office of Historic Preservation, March 1995). The RFA will ensure that forms are submitted to the appropriate Information Center of the California Historical Resources Information System (CHRIS) for assignment of permanent site numbers. These site numbers will be used to the extent possible as inventory reports are prepared.

(b) National Register Bulletin 38 will be the standard used by the RFA to identify and document traditional cultural properties, based on consultation with the Tribe and other tribes, organizations, or individuals who may attach religious and cultural significance to historic properties that may be affected by the Undertaking. Traditional cultural properties identified during inventory may be recorded on the DPR 523 unless the Tribe or another Indian tribe, organization or individual objects. If such objection arises, the properties may be recorded on a form and in a manner that is in accordance with the recommendations of the Tribe or other Indian tribes, organizations or individuals, subject to the confidentiality requirements set forth in Stipulation VI.C., below. If traditional cultural properties affiliated with

other parties are identified during inventory, these parties will be consulted by the RFA in accordance with 36 CFR 800.2(c)(6).

(c) The applicable cultural resource data base including information available from the appropriate Information Center of the California Historical Resources Information System (CHRIS), and professional staff estimation; and

(d) The National Park Service publication, "The Archeological Survey: Methods and Uses" (King 1978);

c. EVALUATING PROPERTIES AND DETERMINING EFFECTS

(1) A Trinity EIS/R implementing action will be exempt from further consideration under this Agreement if any of the following conditions are met:

(a) The RFA=s archaeologist determines that there are no cultural resources in the APE, based on the results of identification efforts outlined in Stipulation III.B. above; or

(b) The RFA=s archaeologist determines that no cultural resources will be affected, based on the results of identification efforts outlined in Stipulation III.B.and C.; or

(c) The RFA=s archaeologist determines that cultural resources may be affected, but based on the evaluation prescribed in paragraph C.2.of this stipulation, such resources are determined ineligible for inclusion in the National Register of Historic Places (NRHP).

(2) If the RFA=s archaeologist determines that an action covered by this Agreement may affect a cultural resource, the RFA=s archaeologist will evaluate the cultural resource in accordance with the process set forth in 36 CFR 800.4(c)(1) before any activity that may affect the resource is initiated. If the resource in question may be a traditional cultural property, the RFA will use National Register Bulletin 38 in conducting the evaluation.

(3) If the RFA determines pursuant to paragraph C.2. of this stipulation, that the cultural resources subject to effects are eligible for inclusion in the NRHP, the RFA=s archaeologist will follow 36 CFR 800.5 to determine whether such effects may be adverse.

(a) If this consultation results in a finding of no adverse effect to historic properties, the RFA=s archaeologist will conclude the consultation by complying with 36 CFR 800.5(d).

(b) If this consultation results in a finding that historic properties will be adversely affected, the RFA=s archaeologist will ensure that the adverse effects are taken into account in accordance with paragraph D. of this stipulation.

d. HISTORIC PROPERTY TREATMENT PLANS (HPTPs)

(1) The RFA=s archaeologist will develop HPTPs to resolve the adverse effects on historic properties of actions covered by this Agreement. Separate HPTPs may be prepared for individual Trinity EIS/R implementation actions. HPTPs will be developed by the RFA in consultation with the SHPO, the Tribe, other Indian tribes, organizations and individuals, and the Council if it so requests, and with any interested parties identified by the signatory parties to this Agreement. HPTPs will be submitted for review according to the procedures set forth in paragraph D.4. of this stipulation.

(2) HPTPs will be consistent with the AArchaeology and Historic Preservation: Secretary of Interior=s Standards and Guidelines (FR 44716-44742), including the "Secretary of the Interior's Standards and Guidelines for Archaeological Documentation" (48 FR 44734-37)" and the Council's "Recommended Approach for Consultation on Recovery of Significant Information from Archeological Sites" (64 FR 27085-87). HPTPs shall at a minimum:

Describe the historic property or portion of the property where treatment will be implemented. The HPTP shall contain a description of the values that make the property eligible for the National Register of Historic Places, and describe the measures proposed to protect each historic property. These measures may include, but not necessarily be limited to avoidance, monitoring, capping, fencing, land use policy and planning techniques such as zoning restrictions, protective covenants, etc. The preservation of historic properties is the preferred alternative, wherever feasible; if data recovery is proposed, the HPTP also shall:

(a) Specify the research questions to be addressed through recovery of data;

(b) Explain why it is in the public interest to address these research questions, including a description of any efforts to interpret the result of the investigations for the public;

(c) Explain how the historic properties subject to data recovery can address these research questions;

(d) Specify the methods to be used in field work and analysis, and explain how these methods are relevant to the research questions;

(e) Indicate how recovered material and records will be disposed of, taking into account the expressed wishes of the Tribe, of other Indian tribes, organizations, or individuals and, as applicable, of interested parties;

(f) Provide a schedule for completing data recovery, including analysis, reporting and disposition of materials and records;

(g) Include a schedule for providing the Tribe, other Indian tribes, organizations and individuals, SHPO and, as applicable, interested parties, with the opportunity to review and comment on reports documenting implementation of HPTPs.

(h) Include a schedule for completing final data recovery reports and specify when and to whom this report will be distributed;

(i) Provide for development and implementation of a Plan of Action in accordance with 43 CFR 10 for the management of Native American cultural items that will be repatriated to the Tribe or to other Indian tribes pursuant to the Native American Graves Protection and Repatriation Act (NAGPRA); or, where non-federal property is involved, a plan providing for the treatment of Native American human remains and items associated with Native American burials in accordance with the requirements of Sections 5097.98 and 5097.991 of the California Public Resources Code;

(j) Specify that, following any repatriation pursuant to item I., above, the RFA will ensure that all records and all non-repatriated objects resulting from data recovery are curated in accordance with 36 CFR 79;

(k) Include a plan for the treatment of properties discovered during implementation of an action covered by this Agreement;

(l) Include a plan for monitoring construction activities that may affect historic properties; this plan shall include a monitoring schedule, provide for the participation of a professional archeologist, and, as appropriate, Tribal member(s), members of other Indian tribes, organizations, individuals and interested parties.

(3) The RFA will submit draft HPTPs to the SHPO, the Tribe, other Indian tribes, organizations and individuals, the Council if it so requests after being informed of its development, and to any interested parties identified by the signatory parties, for review and comment. These parties shall have 30 days from receipt of any draft HPTP to comment. Failure to respond within this time frame shall not preclude the RFA from finalizing the HPTP. Before it finalizes the HPTP, the RFA will provide the reviewing parties with documentation indicating whether and how any comments from the parties will be incorporated into the final HPTP. Unless the reviewing parties object to this documentation within 15 days following receipt, the RFA may finalize the HPTP as it deems appropriate, and proceed to implement the final HPTP. If the RFA proposes to change a final HPTP, it will notify the reviewing parties about the proposed changes. Reviewing parties will have 10 days from receipt of notification to comment. Failure to respond within this time frame shall not preclude the RFA from changing the final HPTP. Before it changes the final HPTP, the RFA will provide the reviewing parties with documentation indicating whether and how any comments from the parties will be incorporated into the proposed changes. Unless the parties object to this documentation within 10 days following receipt, the RFA may change the final HPTP as it deems appropriate, and proceed to implement the amended final HPTP.

IV. NATIVE AMERICAN CONSULTATION, CURATION AND TREATMENT OF CULTURAL MATERIALS AND HUMAN REMAINS OF NATIVE AMERICAN ORIGIN

a. Reclamation and the Service will ensure that Indian tribes, organizations and individuals are consulted during, and are invited to participate in, the implementation of the terms of this Agreement. Such

consultation and participation shall include the preparation of reports that document such implementation.

b. Reclamation and the Service shall ensure that all records and materials resulting from activities carried out pursuant to this Agreement are curated pursuant to 36 CFR 79 and the provisions of the NAGPRA, 43 CFR 10, as applicable.

c. Reclamation and the Service shall ensure that any Native American human remains and objects defined under NAGPRA encountered through activities carried out pursuant to this Agreement are treated with due respect, and according to the provisions of NAGPRA, its implementing regulations, 43 CFR 10, and, as appropriate, in accordance with applicable state law.

d. Reclamation and the Service will ensure that the expressed wishes of Indian tribes, organizations, and individuals are taken into account when decisions are made relating to the treatment and disposition of Native American archaeological materials and records not subject to the provisions of NAGPRA.

V. PUBLIC PARTICIPATION

Reclamation and the Service shall use the NEPA process, and any other process they deem appropriate, to solicit public comment on the actions covered by this Agreement. The RFA shall ensure that historic preservation issues are included in notices of public meetings so that these issues can be considered and addressed in a timely manner.

VI. DOWNSTREAM AND RESERVOIR DRAWDOWN IMPACTS TO HISTORIC PROPERTIES

Reclamation and the Service shall incorporate and consider effects to historic properties in its conduct of the overall adaptive management program for the Trinity River, should such program be carried out.

Within 1 year of the execution of this Agreement, Reclamation and the Service shall ensure that a cultural resources management plan is developed addressing the identification, evaluation, and assessment of effects to historic properties within the APE downstream of and within the drawdown zone of Trinity Dam that may be affected by inundation, erosion, vandalism, and other indirect effects of the Undertaking. A draft version of the Plan shall be provided to the signatories to this Agreement for a 30-day review, revised to address the comments received, and then implemented. The Plan, developed in consultation with the SHPO, the Tribe, the agencies, and other tribes, organizations, and individuals who may attach religious and cultural significance to historic properties within this specified area, shall discuss:

a. How historic properties will be identified and evaluated for their National Register of Historic Places eligibility;

b. How changes to the integrity and physical condition of historic properties attributable to erosion, inundation, vandalism, and other effects of the Undertaking will be identified and treated; and

c. A schedule for carrying out items 1 and 2, above.

VII. ADMINISTRATIVE STIPULATIONS

a. PROFESSIONAL STANDARDS

(1) All work required by this Agreement that addresses the identification, evaluation, treatment and documentation of historic or potentially historic properties shall be carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior=s Professional Qualifications Standards (48 FR 44738-39) (PQS) in the appropriate disciplines. However, nothing in this stipulation may be interpreted to preclude Reclamation and/or Service or any agent or contractor thereof from using the properly supervised services of persons who do not meet the PQS.

(2) All documentation required by this Agreement that addresses the identification, evaluation, and treatment of historic or potentially historic properties shall be responsive to contemporary professional standards, to the Secretary of Interior=s Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-40), National Park Service Bulletin 38, as well as to standards and guidelines established by the SHPO.

b. REPORT DISTRIBUTION

The RFA shall ensure that copies of all technical reports prepared to satisfy the terms of this Agreement are provided upon completion to the SHPO, the Tribe, other Indian tribes, the appropriate CHRIS Information Center, and to any interested parties designated by the signatory parties to this Agreement. The content of these reports shall be subject to the confidentiality requirements set forth in paragraph C. of this stipulation.

c. CONFIDENTIALITY

(1) Reclamation and the Service shall ensure that all sensitive information, as defined in Section 9 of the Archeological Resources Protection Act (ARPA), Section 304 of the NHPA, and NAGPRA, is managed in such a way that historic properties, traditional cultural properties, sacred objects, and human remains are not compromised, to the fullest extent available under law.

(2) Signatory and concurring parties to this Agreement shall safeguard information about the nature and location of archeological, historic, and traditional cultural properties, and not reveal that information to any additional parties, pursuant to Section 304 of the NHPA and Section 9 of the ARPA, without the express written permission of Reclamation or the Service.

d. REVIEWING IMPLEMENTATION OF THE AGREEMENT

(1) No later than one year after execution of this Agreement, and by the anniversary date of such execution each year thereafter, until the signatory parties to this Agreement agree in writing that its terms have been

fulfilled, Reclamation assisted by the Service, will prepare and provide to all parties to this Agreement, and to each Indian tribe involved in any action covered by this Agreement, a written report that includes, but is not necessarily limited to the following:

(a) A narrative that indicates how many actions were undertaken and that describes and discusses how and with what results, the requirements of Stipulations III. - V., inclusive, were met for each action;

(b) An assessment of the effectiveness of this Agreement;

(c) A discussion of any problems or unexpected issues encountered during the year;

(d) Any changes that Reclamation or the Service believe should be made in implementing this Agreement.

The reviewing parties shall have 45 days from the date of receipt to provide Reclamation and the Service with comments on the annual report. Reclamation and the Service shall take all comments received into account when considering modifications to this Agreement.

(2) At the request of any signatory, Reclamation or the Service shall hold a consultation meeting to facilitate review and comment on the annual report, or to resolve questions, issues or adverse comments that have been raised by the other signatories or by a member of the public. The signatory parties shall consult to identify other parties who may be invited to attend this meeting.

e. RESOLVING OBJECTIONS

(1) Should any signatory to this Agreement, any Indian tribe, organization or individual, or member of the public object in writing to Reclamation or to the Service regarding the manner in which the terms of this Agreement are carried out, or to any documentation prepared in accordance with and subject to the terms of this Agreement, the RFA shall consult with the objecting party to address the objection. The RFA shall determine a reasonable time frame for this consultation. If resolution is reached within this time frame, the RFA may proceed with its action in accordance with the terms of the resolution. If resolution is not reached within this time frame, the RFA shall forward all documentation relevant to the objection to the Council, including the RFA=s proposed response to the objection. Within 30 days after receipt of all pertinent documentation, the Council shall exercise one of the following options:

(a) Advise the RFA that the Council concurs in its proposed response to the objection, whereupon the RFA will respond to the objection accordingly. Thereafter, the RFA may proceed with its action in a manner consistent with its proposed response; or

(b) Provide the RFA with recommendations, which the RFA will take

into account in reaching a final decision regarding its response to the objection. Upon reaching its final decision, the RFA will notify the objecting party and the Council of its final decision, and may thereafter proceed with its action; or

(c) Notify the RFA that the objection will be referred for comment, pursuant to 36 CFR 800.7(a)(4), and proceed to refer the objection and comment. In this event, the RFA shall ensure that their agency heads are prepared to take the resulting comment into account in accordance with 36 CFR 800.7(c)(4) and Section 110(l) of the NHPA. Thereafter, the RFA shall notify the objecting party and the Council of its final decision regarding the objection ,and may thereafter proceed with its action.

(2) Should the Council not exercise one of the foregoing options within 30 days after receipt of all pertinent documentation, the RFA may assume the Council=s concurrence in its proposed response to the objection, advise the objecting party of that response and proceed with its action in a manner consistent with that response.

(3) Disputes pertaining to the NRHP eligibility of cultural resources covered by this Agreement shall be addressed through consultation among the signatories. If such consultation fails to resolve the dispute within a time frame deemed reasonable by the RFA, the dispute will be addressed by the RFA in accordance with 36 CFR ' 800.4(c)(2).

f. AMENDMENT AND TERMINATION

(1) If any signatory believes that this Agreement should be amended, that signatory may at any time propose amendments, whereupon the signatories will consult to consider the amendment pursuant to 36 CFR ' 800.6(c)(7) and 800.6(c)(8). This Agreement may be amended only upon the written concurrence of the signatory parties.

(2) Any signatory party may terminate this Agreement. Termination of this Agreement shall proceed in accordance with the applicable provisions of 36 CFR Part 800.

(3) If this Agreement is terminated and the RFAs elect to proceed with the Undertaking, the RFAs shall comply with 36 CFR ' 800.14(b)(2)(v).

g. DURATION OF THE AGREEMENT

This Agreement will remain in effect for a period of 20 years after all the signatory parties have executed it. At the end of this time period, the Agreement will become null and void, unless it is extended by written agreement of the signatory parties. Not later than 6 months prior to the expiration of the Agreement the RFAs will notify all other parties to the Agreement of its pending expiration and, if the parties choose to continue considering the Undertaking, the RFAs shall reinitiate review of the Undertaking in accordance with 36 CFR Part 800.

h. EFFECTIVE DATE

This Agreement shall take effect when it has been executed by all of the signatory parties.

EXECUTION of this Programmatic Agreement by Reclamation, the Service, the Bureau, the Tribe, the SHPO and the Council and implementation of its terms, evidence that Reclamation, the Service, the Bureau and the Tribe have afforded the Council a reasonable opportunity to comment on the implementation of the alternatives evaluated in the Trinity EIS/R and its effects on historic properties, and that Reclamation, the Service, the Bureau and the Tribe have taken into account the effects of each action comprising implementation of the Trinity River Mainstem Fishery Restoration program on historic properties.

SIGNATORY PARTIES:

ADVISORY COUNCIL ON HISTORIC PRESERVATION

BY: _____ DATE: _____

TITLE: _____

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

BY: _____ DATE: _____

TITLE: _____

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

BY: _____ DATE: _____

TITLE: _____

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BY: _____ DATE: _____

TITLE: _____

HOOPA VALLEY TRIBE

BY: _____ DATE: _____

TITLE: _____

CALIFORNIA HISTORIC PRESERVATION OFFICER

BY: _____ DATE: _____

TITLE: _____

CONCURRING PARTIES:

APPENDIX P

Trinity River Bridges Replacement
Cultural Resources Report

BUREAU OF RECLAMATION
MID-PACIFIC REGION
SACRAMENTO, CA

CULTURAL RESOURCES REPORT

1. C.R. Report Number: 00- **2. Date of Study:** Nov. 28-29,2000

3. Archeologist: G. James West/Pat Welch

4. Project Name and Description: Trinity River Mainstem Fishery Restoration, Trinity River Bridge Replacements. Substrate core sites. Potential increased flows on the Trinity River may adversely affect four bridges crossing the Trinity River. New bridges will need to be constructed that can structurally withstand the potential flow increases above the current flow scenario. Drill holes are required to identify bedrock for new bridge footings. The bridges to be affected are Salt Flat, Bucktail Poker Bar and Tredwell. With the exception of the county owned Bucktail Bridge, all are privately owned.

5. BOR Project: CVP- Trinity Division

6. County and State: Trinity County, California

7. Land Status: Trinity County (1) and Private (3)

8. Legal Description: T.33 N, R.9 W, Sections 13,23,27/28, 32 **Meridian:** MD

9. Relation to Cadastral Markers: none

10. Relation to other Permanent Features: Salt Flat Bridge on northern edge of Salt Flat; Bucktail Bridge due east of Bucktail; Poker Bar Bridge on eastern edge of Poker Bar; Tredwell Bridge upstream on Trinity River approximately 1/3 of a mile above McIntyre Gulch junction.

11. Map Reference: Weaverville (PE 1982); Lewiston (PE 1982)

12. Purpose of Survey: Identification and evaluation for Section 106 NHPA compliance.
13. Consultation and Data Review: USBR Class I Archeological Survey Records for Trinity River.

16. Environment:
Elevation- 500
Vegetation- riparian-willows, alders, berry bushes
Geology- sands, gravels and cobbles
Landform- flood plain of Trinity River
Nearest water and type- Trinity River.

17. Field Technique: Each bridge and drill hole site was examined and photographed.

18. Results: Salt Flat Bridge, a single lane bridge, is constructed of railroad flat bed cars with the undercarriage removed. The flat cars sit on welded steel piers. The piers have v-shaped steel plates on their upstream side. The workmanship is crude but functional. Short stanchions (30" high) with steel cable life lines are present along portions of both sides of the bridge. The bridge is recent (< 50 years old) and has no outstanding features. It is located on the flood plain. Local deposits consist of river sands, gravels and boulders. The abutment areas are highly disturbed by vehicles and past construction activities. No original contours remain.

Bucktail is a recently constructed concrete bridge (< 10 years old). The area has been previously surveyed by CALTRANS and no historic sites were recorded. The recent construction has completely altered the abutments and the proposed drill hole locations.

Poker Bar, a one lane bridge, consists of two spans. The southern span has concrete abutments that contain rubble fill. These abutments are highly fractured and appear to be undercut. A single lane steel I-beam with a wood planks form this span. The northern span, located in the flood plain, consists of two flat bed railroad cars laid side-by-side. The abutments are rubble fill. The construction of the Poker Bar bridge is extremely crude and its condition is poor. The rail cars are less than 50 years of age.

Tredwell is a one lane wood deck bridge set on steel T beams. The beams rest on concrete piers that are set into flood plain deposits. The bridge is in poor condition.

19. National Register Recommendations: All four bridges are simple structures that have been recently replaced or modified. None appear to be greater than 50 years of age. The bridges or their spans have been repeatedly washed out during flood events. The use of railroad flat bed cars has been a cheap alternative to more substantial construction. They are not associated with any important persons or places and have no outstanding engineering or aesthetic values that would make them eligible to the National Register. The abutments of all bridges are naturally (riverflows) or culturally (mechanically) disturbed and do not contain any historic resources.

20. Determination of Affect. No effect

Summary and Avoidance/Mitigation Recommendations: The proposed actions- drilling or bridge modifications- will have no effect on historic properties. In the unlikely event that cultural remains are found, work in the area of the find should be halted and the Regional Archeologist notified. The Regional Archeologist or his designated representative will evaluate the finds significance and recommend alternatives.

21. Acreage: 2

22. Submitted by: G. J. West **Date:** 1 Dec 00

23. Approved by: **Date:**

24. Notes or Comments:

25. Native American Consultation: NA

26. References:

APPENDIX Q

Memorandum of Understanding BLM and Nor-Rel-Muk Nation for Salt Flat

MEMORANDUM OF UNDERSTANDING

between

THE NOR EL MUK WINTU

and

THE BUREAU OF LAND MANAGEMENT

for

STEWARDSHIP OF SALT FLAT

and

CONTINUED CONSULTATION

Purpose

The purpose of this stewardship/consultation agreement is to provide opportunities whereby the Nor El Muk Wintu (Wintu) may assist the Bureau of Land Management (BLM) in managing the Salt Flat Native American Indian cultural complex and attendant natural resources (as present on public land). This agreement is also for coordinating the management of other cultural and natural resources of concern on public lands in a manner that will serve the American people, and protect the cultural and natural values and traditions of the Wintu. This document in addition serves as a communication bridge between BLM and the Nor El Muk Wintu.

Salt Flat

The Salt Flat Ethnohistoric Complex (CA-TRI-862) is located in the vicinity of Lewiston, Trinity County, California, on upper Salt Flat. This location is west of the Trinity River within the foothills of Browns Mountain in T. 33 N., R. 9 W., M.D.M., Section 13.

The sensitive cultural resources and remains include at least two Native American Indian cemeteries, a probable Native American Indian dancehouse/sweathouse, a number of historic cabin and other building foundations and pads, a patch of prehistoric midden, and possibly some prehistoric structural depressions. This location was a former Wintu settlement and ceremonial area.

Protection of the various remains and resources has been an on-going concern of the Wintu and BLM. Past actions include cleaning and fencing one cemetery with placement of a sign, archaeological test excavations at cabin locations, and periodic monitoring.

Other Locations of Concern

A number of identified and as yet unidentified cultural and natural resources are present on BLM lands in Trinity County that are of mutual concern. BLM and the Wintu will continue to communicate regarding the management of these various resources.

Bureau of Land Management

The BLM is responsible for the care and judicious use of the public lands of the United States. BLM's goal is quality land management. BLM is committed to protecting, maintaining and improving the cultural and natural resource conditions on these lands--balancing environmental, social and economic needs--in a manner that will serve the American people in perpetuity. BLM is also obligated under Executive Order 13007 to accommodate access to and ceremonial use of

Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Furthermore, under BLM Manual Handbook H-8160-1, the agency must establish ongoing, credible consultation relationships with the Native American peoples whose interests are potentially affected by the BLM's multiple use management of the public lands.

AGREEMENT

The Bureau of Land Management agrees to:

1. Maintain consultation with the Nor El Muk Wintu regarding land management actions and explain current management directions and decisions.

2. Recognize and respect the Wintu's cultural and religious values and traditions; and comply with Federal law and legislative mandates to meet our obligations to the Wintu in this regard.

3. Manage the Salt Flat area in accordance with the existing Resource Management Plan and cultural resource plan (see attachment), recognizing the Wintu's interest and concern with the management of the area, and involving the Wintu in any further planning regarding the region.

4. Provide a volunteer service agreement to the Nor El Muk Wintu to include any members that would be participating in on-the-ground activities. Furthermore, BLM would like to offer cultural resource training to members as appropriate and available should members so wish.

5. Provide maps and materials and supplies related to approved management actions as available.

6. Provide information as available regarding access to public lands.

The Nor El Muk Wintu agree to:

1. Assist the BLM with the development and implementation of planning with regard to Salt Flat and other areas or resources of concern to the Wintu.

2. Assign and supervise Wintu members who will serve as BLM volunteers and do the following on public lands, subject to legal access:

    a. Oversee the Salt Flat location on a regular basis, reporting problems to the BLM or the Trinity County Sheriff's office.

    b. Clean the Salt Flat area of litter and debris that is not historical in character.

    c. Regularly check and maintain any fences and signs, if

possible, within the Salt Flat area. (Construction of a fence around the smaller cemetery will be mutually explored).

d. Assist BLM in agreeable studies related to the cultural and natural resources in Salt Flat and elsewhere on BLM lands.

e. Provide guidance and labor, if available, for development of natural resource enhancement projects that relate to traditional practices and beliefs. This may include projects related to the propagation of basketry materials, native food stuffs, etc.

Amendment and Termination

This agreement may be amended with the written agreement of BLM and the Wintu. It may be terminated by either party following a 30 day written notice to the other party.

Agreed to on 2-1-97, 1997 by:

John "Sonny" Hayward
Tribal Chair, Nor El Muk Wintu

Charles M. "Chuck" Schultz
Area Manager, Redding Resource Area

BLM Library
Bldg. 50
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P.O. Box 25047
Denver, Colorado 80225

ER'S CARD

T756 2003 v.4

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Trinity River Bridges Project

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